MAY 1955

FRANCHISE CIRCULATION

Industry & Welding

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NATIONAL WELDING SUPPLY ASSOCIATION MEMBER

PLUS: A SPECIAL SECTION featuring the 11th Annual Convention of the National Welding Supply Association — pictures, background, news.

HEADGEAR
Part No. 62

This headgear has been furnished on all Jackson fiber glass helmets and remains available.

It permits fitting to the head in ⅛" steps, clearly marked in hat sizes for quick, yet firm adjustment before putting the helmet on.

Now You Have the Choice of All Jackson Welding Helmets at No Extra Cost, with the...

NEW Jackson ADJUST-O-LOK

It *adjusts* quickly, *locks* firmly *after* putting the helmet on. Its fine adjustment permits tightening or loosening while wearing the helmet, as you may require. The large, winged knob is easy to handle, even while wearing gloves.

The mechanism, entirely enclosed, smooth against the head, has a minimum of moving parts. Both *knob* and *gear* are of Nylon, lightweight, and non-conductive.

This new ADJUST-O-LOK Headgear is interchangeable with the No. 62 headgear, attaches to the same Jackson friction pivots, adjustable from the outside while in use. Plastic straps, of a new formula, are stronger, self-extinguishing. They're easy to clean. Cork-padded sweatband snaps on quickly, is inexpensive to replace.

CHOOSE FROM THESE JACKSON FIBER GLASS HELMETS . . .

FIXED-FRONT type H-1
Available with metal lens holder or with the new, high-impact plastic lens holder as shown above.

LIFT-FRONT type H-2
permits work inspection without raising entire helmet. Lens holder of high-impact thermosetting plastic has hinged door held by coil springs. Cover glass protects filter lens; another glass protects the eyes when front is raised.

FIXED-FRONT type H-3
of narrow-front design. All parts are interchangeable with type H-1. With metal or plastic lens holder.

LIFT-FRONT type H-4
This narrow-front, fiber-glass helmet has the same parts as type H-2, including plastic lens holder with hinged door for quick work inspection.

—WITH EITHER ADJUST-O-LOK OR HEADGEAR NO. 62

Also New . . .

HANDSHIELDS H-5 and H-6

They consist of the same fiber glass shells as Helmets H-1 and H-3 respectively, and are fitted with new plastic insulated fixed-front lens retainers and vulcanized fiber handles.

JACKSON
PRODUCTS, INC.
WARREN · MICHIGAN

SOLD THROUGH DISTRIBUTORS AND DEALERS THROUGHOUT THE WORLD

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Circle No. 2 on Reader Service Card. →

Hobart 900-ampere "Powromatic" Constant Voltage Welder connected to a tractor driven welding head for welding deck plate in the construction of river barges. Hobart's simplified lightweight control kit is shown mounted on the tractor.

Photo courtesy of Maxon Construction Co., Marine Division, Tell City, Indiana

Maxon simplified production and increased weld rate with this—

HOBART CV POWROMATIC

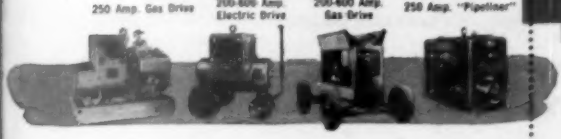
a *NEW* "Simplified" WELDER and CONTROLS for Automatic Welding

"Powromatic" is Hobart's constant voltage power source and simplified controls for all automatic and semi-automatic welding processes.

MARINE DIVISION of Maxon Construction Co., Tell City, Indiana, recently began using a "Powromatic" welder to weld 5/8 and 3/8-inch barge deck plate. The length of the weld is approximately 85 feet with torch cut edges and no back-up on the butt joint. Conventional equipment was replaced by "Powromatic" because of easier arc control and the reduction of weight on the tractor type head, making it more maneuverable and easier to manipulate. Through the use of Hobart CV, the weld rate was increased from 30 to 40 inches per minute and the operation was greatly simplified.

OTHER ADVANTAGES found in the Hobart "Powromatic" welder and controls are: The operator is assured of a constant arc voltage because the brushes on the main generator end of the unit can be adjusted so that the voltage drop in extended welding cable is compensated for by a slightly rising voltage characteristic. And the arc voltage of Hobart's "Powromatic" remains constant even when there are fluctuations in the input voltage. It completely eliminates burn-back and burn-through due to arc voltage fluctuations.

THE SIMPLICITY and superior control of Hobart "Powromatic" welders are reducing manufacturing costs wherever they are installed. If you use automatic welding now, or intend to in the future, you should investigate "Powromatic." Check coupon and return for complete details.



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BOX HW-55, TROY, OHIO, U.S.A. Phone 21223

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Without obligation, please send me complete information on items checked below.

- ☐ Complete information on Hobart CV POWROMATIC and Heads for Automatic Welding.
- ☐ Tell me how we can simplify Automatic Welding with our present Heads by using Hobart POWROMATIC.
- ☐ Send latest HOBART Simplified Arc Welder Catalog.

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BUILD BETTER HOME LAUNDRIES

Mills, Welds, Tests

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It is believed to be the first machine to combine a milling operation with resistance welding. It also assembles three parts and performs a 100% test — completing 1000 finished assemblies per hour with one operator.

The assembly is a tub suspension rod, and is comprised of a length of rod, a bracket and two metal discs. The operator fits the bracket over the rod and drops it into a hopper — the machine does the rest. It carries the rod to a milling station where the rod ends are machined to proper radius for best projection welding. The two discs are hopper fed to the ends of the rod at the welding station. After welding the parts are automatically transferred to a test station where each assembly is given a 3000 pound "pull test." This is another example of how Federal's "know how" in resistance welding is paying dividends to one of America's leading manufacturers. Next time you're considering your welding operation — think of *Federal—First in Resistance Welding.*

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Warco PRESSES ®

The Federal Machine and Welder Company

WARREN, OHIO

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WELD IT WITH WELDIT EQUIPMENT SUPERIOR

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- Modern designing by top-flight welding engineers.
- Constant laboratory and production tests assure high efficiency and low operating costs.

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Roman artificers working at a primitive anvil, welding a sword handle to a blade by the Fusion Method of welding. The early Romans were gifted in this art several centuries before Christ.

- Thousands of users, throughout the world have, for years, used Weldit torches for every welding requirement.
- Originators of the famous Weldit Weldimatic torch and the Weldit Gasaver.

WELDIT BLOWPIPE

NO. C-47

The new Weldit Weldimatic Blowpipe fabricated of special aluminum alloy, combines advantages that appeal to every welder.

The C-47-W features light weight, less operator fatigue, increased capacity, more economy. The pilot automatically relights blowpipe when lever is pressed. Built to close engineering standards, plungers are of stainless steel, special design provides constant tension on pilot adjustment. Write for descriptive folder.

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Weldit INC. SINCE 1918

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No. 602-S-C with #1003 Insulated Steel Glass Holder

No. 706-S-C with #1006 Insulated Duranatel Lift-Front Glass Holder

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Inside view showing INNER BIB of Series "660" Helmets for extra protection to welder's neck from flashes and reflected glare.

New Series "400" Helmets. Smaller size for close quarter work.

*OWENS-CORNING TRADE MARK

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Industry & Welding

MAY, 1955
VOL. 28 No. 5

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HARRIS SUPER-HEAT TORCH NO. K23

Heat is the Prime Factor utilized in connection with innumerable Metal Working Operations. While it is a fact that the Oxy-Acetylene Welding Torch is universal in its applications, there are many Operations requiring a much greater volume of Intense Heat than can be obtained from a Welding Torch.

A definite limitation exists relative to the amount of Oxygen and Acetylene Gases which can be safely mixed without danger of the Flame "Back-firing", due to the extremely fast Flame Propagation Characteristics of such Gas Mixtures. On the other hand, much larger volumes of such Fuel Gases as Propane, City Gas and Natural Gases can be safely mixed with Oxygen on account of their lower rate of Flame Propagation. It is evident the larger the volume of Gases mixed, the greater the Flame and resulting Heating Value. This produces the truly phenomenal results achieved by this Harris Super-Heating Torch.

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Literature Featured In Ads This Month

(CIRCLE ON ENCLOSED POSTCARD, NUMBERS OF LITERATURE YOU WISH TO RECEIVE)

2 **Constant voltage power source** and simplified controls for all automatic and semi-automatic welding processes are featured. HOBART BROS. CO. Page 1.

4 **New, lightweight blowpipe** with special features is described in folder. WELDIT, INC. Page 3.

7 **Safety Equipment for welding** and cutting operations are featured in complete catalog. CHICAGO EYE SHIELD CO. Page 7.

8 **Resistance welding catalog** lists complete line of electrodes, holders, wheels, forgings and accessories. P. R. MALLORY & CO., INC. Page 9.

9 **Quick-charging, lightweight acetylene cylinders** are featured in descriptive literature. COYNE CYLINDER CO. Page 10.

72 **Pneumatic tools for weld grinding** and finishing are descibed and illustrated in brochure. MASTER PNEUMATIC TOOL CO., INC. Page 12.

14 **Durable cutting torch** and new single-stage regulators are featured in 24-page catalog of oxy-acetylene equipment and accessories. K-G EQUIPMENT CO., INC. Page 15.

15 **Positive, precision rotation** for automatic welding is described in positioner catalog. ARONSON MACHINE CO. Page 17.

18 **Air-inflated grinding wheel** with interchangeable contact drums is available for 25-day free trial. NUMATIC GRINDERS, INC. Page 20.

17 **Versatile welding fixture** for automatic operations is featured. LEWIS WELDING & ENGINEERING CO. Page 21.

20 **Two complete catalogs**—one on arc welding equipment and accessories and the other on oxy-acetylene equipment and supplies—are available. LIQUID CARBONIC CORP. Page 25.

21 **Real production grinder** for hard-to-get-at places is how ¼ hp, lightweight grinder is described. J&H PRODUCTS CO. Page 26.

22 **Stainless steel wire** for metallizing operations is feature in Rezistal bulletin. CRUCIBLE STEEL CO. OF AMERICA. Page 27.

24 **Cast iron welding made easy** with two special electrodes is explained in free folders. INTERNATIONAL NICKEL CO., INC. Page 28.

25 **Cool, light and durable** is way catalog described new electrode holder. ERICO PRODUCTS, INC. Page 31.

28 **New iron powder electrodes** recently introduced are described in bulletin. NATIONAL CYLINDER GAS CO. Pages 34-35.

35 **"How to Overcome Your Welding Problems"** is title of booklet which explains principles of low temperature welding alloys. EUTECTIC WELDING ALLOYS CORP. Page 49.

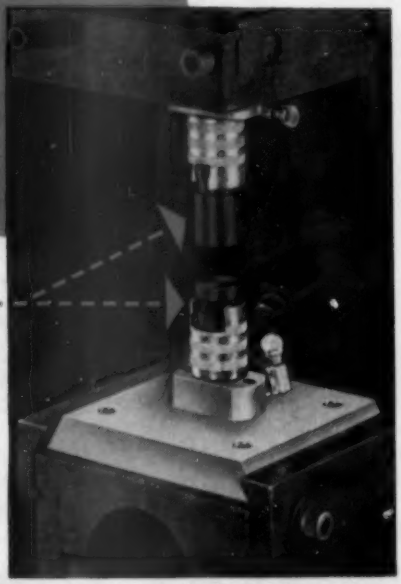
33 **Hardfacing guidebook** gives detailed instructions for various applications. STOODY COMPANY. Page 53.

38 **Cost cutting twins** — AC-DC welding machine and iron powder electrode — are featured in Bulletin 1343. LINCOLN ELECTRIC CO. Page 67.

Welding Set-Ups Switched in Seconds

with the

MALLORY "Nu-Twist"® Die Adaptor



PUT this time-saving idea to work in your resistance welding production, and you will eliminate many precious minutes of change-over time.

The Mallory "Nu-Twist" Die Adaptor lets you switch set-ups *in only seconds*. A single die accommodates different electrode inserts. Just turn the adaptor nut, slide out the electrode insert, set in a different one, tighten, and you have a completely new set-up.

Especially valuable for short-run production, "Nu-Twist" gives you practically instantaneous changeovers between projection, spot, mash welding and electrical upsetting. It cuts your inventory, too; all you need is one adaptor and as many different inserts as your production requires.

To fit your welding machine, we supply eight different styles of die adaptor bases, machined to your specifications. Notable among these is the new *Short* "Nu-Twist" Die Adaptor Base, which provides exceptionally small height to go into limited machine space. In addition, our engineers will be glad to design special bases and electrode inserts for your particular requirements.

See your nearby Mallory welding distributor for complete information, or write to Mallory for your copy of our latest Catalog that lists the full line of Mallory resistance welding electrodes, holders, seam welding wheels, forgings and accessories.

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For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio

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47 **Brazing alloys of every size, shape and form** are featured in bulletin. ALLOY RING SERVICE, INC. Page 75.

43 **Advantages of positioned welding** are featured in Bulletin WP26. CULLEN-FRIESTEDT CO. Page 76.

55 **Complete line of gas regulators** and their many advantages are featured in colorful new Catalog 55. OXO WELDING EQUIPMENT CO. Page 83.

48 **Electrode holders and ground clamps** are featured in "HI-AMP" story. WAGNER MANUFACTURING CO. Page 86.

49 **All your steel needs are listed** for easy ordering in new stock list. U. S. STEEL SUPPLY DIVISION. Page 87.

52 **Stainless steel welding wire** for semi-automatic and automatic applications is featured in brochure. DRAWALLOY CORP. Page 90.

53 **Better resistance welding** with complete line of electrodes, holders, forgings, castings, alloy rod and bar stock is explained in Catalog 14,6 50-4. WW ALLOYS, INC. Page 91.

64 **For use in iron powder electrodes,** sponge iron powders and their advantges are explained in Bulletin. HOEGANAES SPONGE IRON CORP. Page 104.

66 **Complete line of clamps** is featured in 32-page catalog. ADJUSTABLE CLAMP CO. Page 105.

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Hardness, Rockwell B	72 to 78
Face Bend	180°
Root Bend	180°

Bronze-Arc C conforms to A.W.S.—A.S.T.M. Specification No. B-225-53T, Classification E CuSn-C.

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67 **Cobalt-chromium-tungsten hard-facing alloys** are featured in Bulletin. CROBALT, INC. Page 105.

68 **Ground clamp** that clamps around cable is introduced. H. J. WAGNER. Page 109.

71 **Clamps for every welding application** are featured in catalog. CINCINNATI TOOL CO. Page 107.

102 **For welding manganese steel,** complete line of welding rod and repair shapes are featured in Bulletin No. 451. TAYLOR-WHARTON IRON & STEEL CO. Page 108.

74 **Portable clamps with trigger release** are featured in Bulletin 482-4-6. DETROIT STAMPING CO. Page 106.

80 **Manganese-nickel applicator bars** for every worn tractor grouser are described in free folder. STULZ-SICKLES CO. Page 112.

79 **Universal iron bender** which can handle just about anything made of metal is featured in bulletin. HOSSFELD MFG. Co. Page 112.

82 **"More Profit Dollars"** is the title of a folder which tells how to use new shape-cutter to eliminate contour cutting problems. H & M PIPE BEVELING MACHINE CO. Page 113.

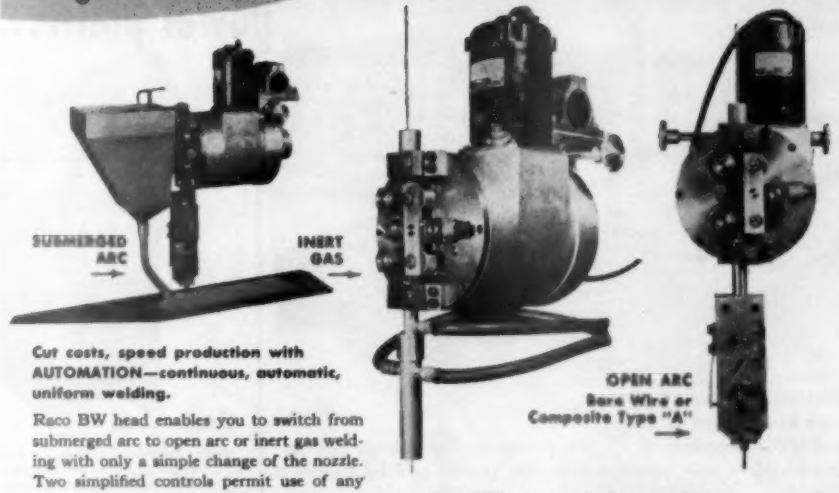
86 **Machineable welds in cast iron** with special powdered iron coated nickel wire is explained. MARQUETTE MFG. CO. Page 115.

100 **Fluxes for brazing and soldering** are featured in bulletin. KREMBS & CO. Page 119.

101 **Lightweight electrode holder** and its many advantages are outlined in bulletin. DURO ENGINEERINC CO. Inside Back Cover.

70% Faster Welding *with*

NEW RACO BW "3 IN 1" AUTOMATIC HEAD



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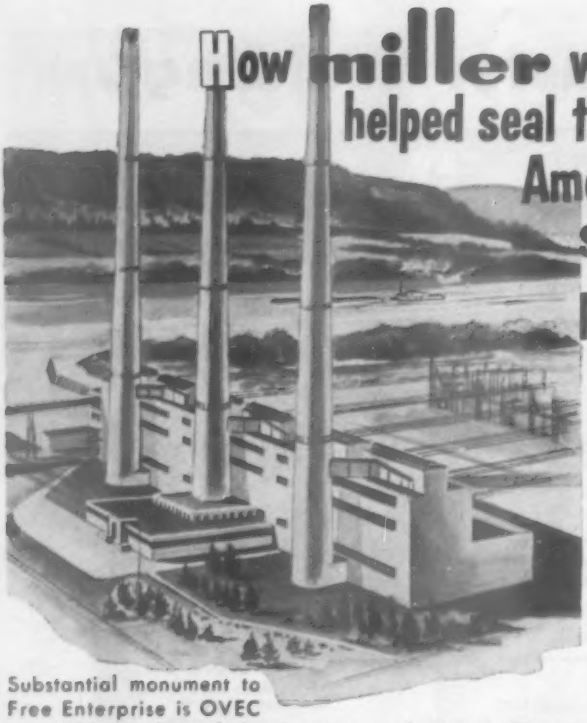


Substantial monument to Free Enterprise is OVEC and IKEC, suppliers of electric power to the Atomic Energy Commission's new uranium diffusion center in Pike County, Ohio.

Ohio Valley Electric Corporation and its subsidiary, Indiana-Kentucky Electric Corporation, agreed to supply electric power to this great new atomic production center . . . *15 billion kilowatt-hours annually.*

Miller Selenium Rectifier d-c Arc Welder, in four wide-range models. For complete, concise, worthwhile information on these and other Miller Arc and Spot Welders, contact us today . . . at no obligation, of course.

Two huge generating stations are being built: The Kyger Creek Plant at Cheshire, Ohio will have five generating units of 200,000 KW each; Madison, Indiana's Clifty Creek plant will produce 1,200,000 KW with its six big generators. Each of the eleven turbo-generating units will operate off a single boiler, with super-heated steam reaching 1,050 degrees Fahrenheit under 2,000 lbs. pressure per square inch! The high temperatures and reheat, which the sponsor companies have pioneered in their own right, will make these two plants among the most economical, most efficient generating stations in the country.

These same elements, however, make the fabrication of faultless high-pressure steam lines vital . . . and extremely difficult. To accomplish this extremely important task, pipe welding specialists equipped with the maximum of engineering skill utilized the Miller Selenium Rectifier d-c Arc Welder.

". . . . if it's Miller, you *know* it's the *finest!*"

miller ELECTRIC MANUFACTURING COMPANY, INC.
APPLETON, WISCONSIN

Distributed in Canada by Canadian Liquid Air Co., Ltd., Montreal, P.Q.

Circle No. 11 on Reader Service Card.

Ask Your K-G Distributor to Demonstrate
These Two Amazing Products

STOP Discarding
Damaged Cutting Tips

Get the torch
with a
"TIP REPAIR SHOP"
Right in its Head!

K-G M38
CUTTING TORCH

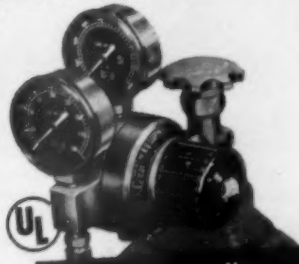
In roughest service, absolutely impervious to flashback!

Even **SAND**
Won't Stop Them!

Since oil and oxygen don't mix

Let Your K-G Distributor Make This Demonstration

Amazing filter action keeps out foreign matter — the basic cause of *seat failure*. Operate perfectly even after sand has been poured into the oxygen inlet! Complete disassembly, reassembly in three minutes with no special tools! *Folder on request.*



Revolutionary New
K-G Single Stage
REGULATORS

Send for NEW 24-page CATALOG
Distributors: Write for franchise information.

The K-G Equipment Co. (Inc.)
Dept. B, 1744 Lehigh St., Allentown, Pa.

Circle No. 14 on Reader Service Card.

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DO YOU KNOW WHY

YOUR SUBSCRIPTION TO THIS

MAGAZINE IS PAID FOR YOU?

You're Chosen Because You Qualify!

INDUSTRY & WELDING readers—more than 35,000—are carefully selected, "hand-picked" by progressive welding supply distributors, because they are 100% interested in welding.

INDUSTRY & WELDING is sent *only* to qualified readers. INDUSTRY & WELDING goes to users whose specifying and or buying responsibilities are guaranteed by local welding supply dealers.

Your local welding supply distributor, who *knows* your interest in welding, who *knows best* your buying habits, who *knows most* what you like to read— **pays** us for your subscription to INDUSTRY & WELDING.

FRANCHISE CIRCULATION

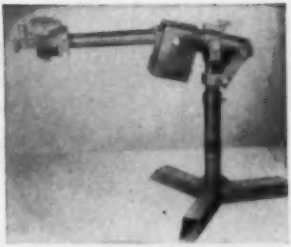
That's Franchise Circulation . . .

that's why YOU get this magazine without charge

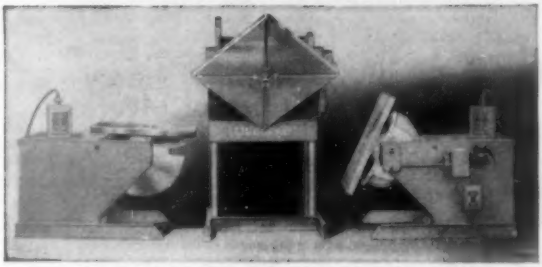
INDUSTRY & WELDING

1240 ONTARIO STREET CLEVELAND 13 OHIO

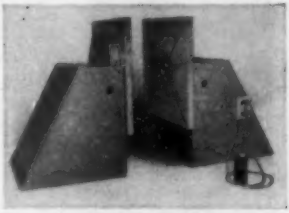
Steady, Positive, Precision Rotation for AUTOMATIC WELDING with *Aronson* Positioning Equipment.



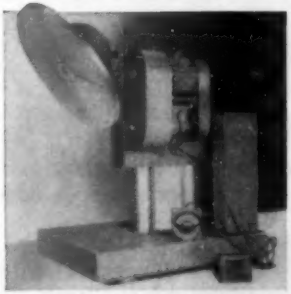
UNIVERSAL Balanced POSITIONING
Model C 500 shown
25 lbs. to 2,000 lbs. capacity



HEAVY DUTY GEAR DRIVEN POSITIONING
Model HD 25 shown
500 lbs. to 24,000 lbs. capacity



HEAD and TAIL STOCK POSITIONING
Model HTS 5 shown
Capacities 5,000 lbs. to 160,000 lbs.



MODEL 21 (shown) SUPER GEAR DRIVEN POSITIONER with powered rotation tilt and elevation.

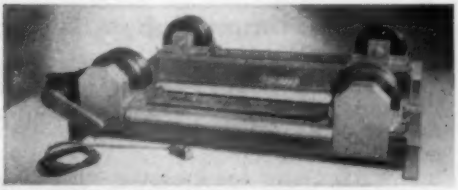
MODEL X-21 Powered rotation, ball bearing manual tilt and elevation.

MODEL 21-P Powered rotation and tilt, ball bearing manual elevation.

MODEL 21-E Powered rotation and elevation, ball bearing manual tilt.

MODEL X-21-PE Powered rotation, tilt and elevation.
5000 lbs. capacity @ 6" CG location.

Aronson TRACTRED Turning Rolls
Steady, positive, precision rotation for automatic welding. **MODEL T1** (shown) capacity 6,000 lbs. per unit. **MODEL T2** capacity 12,000 lbs. per unit. **MODEL T3** capacity 18,000 lbs. per unit.



HEAVY-DUTY PRECISION BUILT RUBBER TIRED TURNING ROLLS
5,000 lbs. to 150 tons capacity

Aronson **MACHINE COMPANY**
ARCADE, NEW YORK

Circle No. 15 on Reader Service Card.

NEWS of the WELDING INDUSTRY

Banner Picks Ohio Rep.

Willard C. Gunzleman has been appointed Ohio representative by Banner Welder, Inc. of Milwaukee, manufacturer of resistance welding equipment. Formerly Vice President of C. B. Herrick Mfg. Corp., he held a similar post in the Cecil C. Peck Co. Mr. Gunzleman is an electro-mechanical engineer with extensive experience in the industry. He has designed a number of automatic welding machines utilizing submerged and inert arc processes.

Gunzleman will maintain sales, service and engineering offices at 2448 Euclid Heights Blvd., Cleveland Heights 6, Ohio .

New Aluminum Tube Mills in Production

Production has been initiated at two new aluminum welded tube mills located at Alcoa, Tennessee, according to a release from Aluminum Company of America. The new mills provide Alcoa with capacity to produce a wide range of welded aluminum tube and pipe not generally available until last year.

3000 To Attend Quality Control Meet

Over 3000 delegates are expected to turn out for the Ninth Annual convention of the American Society for Quality Control. Scheduled for May 23-25 at the Hotel Statler and New Yorker in New York City, the meeting will feature speakers from management, labor and higher education on quality control topics related to metalworking, chemical, paper, food, textile and other industries.

P&H Adds Jack Jarms

Jack J. Jarms has been selected to fill the newly created post of Welding Positioner Specialist for the Harnischfeger Corp., according to an announcement by W. T. Stephens, sales manager of the Welding Division. Jarms will coordinate P&H positioner sales and sales policy between Home Office and Welding Division District Managers and Salesmen, as well as between Distributors and their salesmen.

Jarms is at present on a tour of the United States familiarizing himself with P&H distributors and district salesmen.

are you as yet a smaller welding equipment and supply distributor.

and would you like to grow into a big one more rapidly? ● ● ●

If you consider yourself a growing, aggressive, ambitious distributor in the welding industry, our old established company has a great deal to offer you.

We have been in the welding and the welding equipment business for over 44 years. We believe that those who have sold or purchased NATIONAL welding and cutting torches, regulators, cylinder manifolds and all of the other items we produce, found them good. Found them, beyond doubt, the VERY FINEST money may purchase.

And, what is more important from your point of view, this apparatus is so carefully designed and so well built, that neither you nor your customer will need to spend costly time and vexing hours on frequent repair service and undesirable "shut downs". And, neither you nor your customer will need to invest as heavily in repair parts and in innumerable varieties of models and types. Yet . . . our line is as versatile, as complete, as all-embracing as is any other. But . . . we have taken great care to do our own experimenting rather than impose this thankless and costly task upon our distributors and their precious customers.

We have very much to offer, both to you and to your prospects and customers, and we most cordially invite you to communicate with us BEFORE YOUR TERRITORY WILL BE SPOKEN FOR.

● National ●

we will welcome your inquiry and supply you with full information and printed matter upon request

---

54SH DEPT.

NATIONAL welding equipment company... 218 fremont street san francisco 5 california

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Circle No. 16 on Reader Service Card.

Inco Adds Two

Vernon C. Robinson and Howard N. Farmer have been added to the Development and Research Division of International Nickel Co., Inc. According to a statement by D. J. Reese, assistant manager of the division, Vernon will join the technical staff in Minneapolis. Farmer becomes a member of the Los Angeles Section.

Phillips Opens Atlanta Office

North American Phillips Co., Inc., manufacturers of x-ray equipment and magnetic particle inspection apparatus, has announced opening of an office in Atlanta, Georgia, to serve Mississippi, Alabama, Georgia and Florida. In addition, eleven regional dealer territories have been established.

GE Finishes New Tulsa Home

Completion of a new structure to house General Electric's welding sales branch at Tulsa, Okla., was announced recently by E. K. How, sales manager for the company's Welding Department.

The building, which includes offices, service and warehouse facilities, will serve Colorado, Wyoming, Kansas, Arkansas, and Oklahoma. According to Mr. How, the new G-E facility is designed to improve service to the pipeline industry in the Southwest, as well as to other users of welding equipment, electrodes and accessories.

(More News on Page 108)

CIRCLE NUMBERS ON THE CARD AND MAIL!

RANGE OF DRUM SIZES FIT STANDARD CORE ASSEMBLY
INFLATES TO ANY DESIRED HARDNESS
RECESSED HUB
PUTS A CUSHION OF AIR BEHIND THE ABRASIVE
ROUNDED EDGES
THREADED OR UNTHREADED HOLE UP TO ¾" STANDARD
PLAIN OR SERRATED CONTACT DRUMS

New Aircore Grinding Wheel cuts faster . . . features interchangeable contact drums

One universal core assembly and a range of contact drum sizes — these are the ingredients for a new line of Nu-Matic Air-Inflated Grinding Wheels. To change wheel sizes you simply change the drum. It's like changing from conventional tread tires to snow tread tires on your car. Changing drums takes but a few seconds. The new Aircore models provide these features:

FASTER FINISHING
BETTER WORK
INCREASED BELT LIFE
FOLLOWS CONTOURS
LIGHT WEIGHT

COMPARE AT OUR EXPENSE — Send for 25-day free trial. Give job requirements and type and size of power tool used.

NU-MATIC GRINDERS, INC.
8224-P Carnegie Ave. Cleveland 3, Ohio

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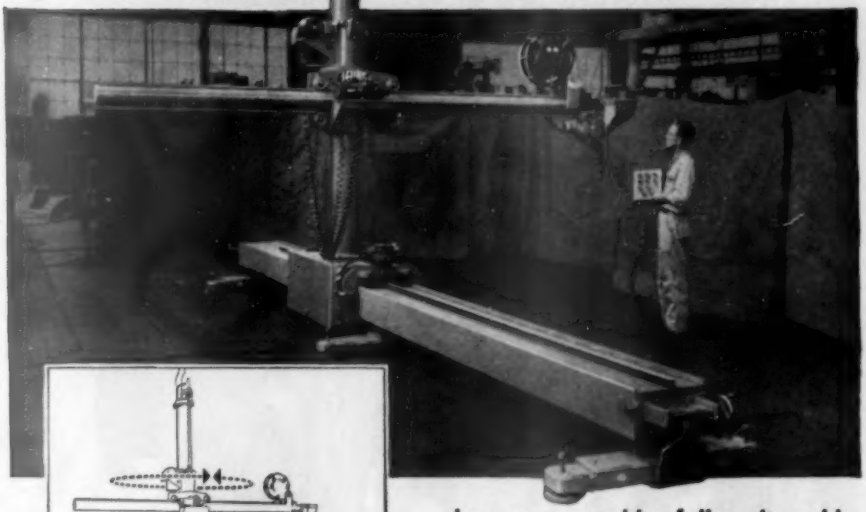
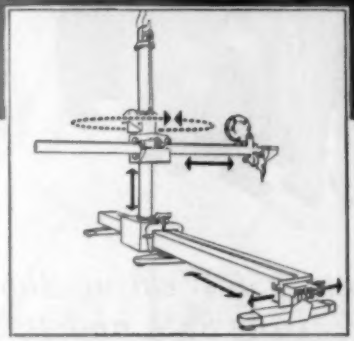
THE WORLD'S MOST VERSATILE WELDING FIXTURE





. . . the new, portable, fully adjustable

LEWIS "UNIVERSAL" WELDER

Exclusive features of this LEWIS automatic welding fixture include full portability . . . simultaneous 3-directional travel . . . 360° boom rotation . . . adjustable base . . . use of any standard head for welding, flame cutting or hardening.

Designed to handle a wide variety of jobs, this fixture reduces set-up time for large weldments 60% or more. It can be moved easily by crane to any plant location. Full boom rotation permits multiple set-ups with only one machine.

The LEWIS "Universal" Welder has 18 feet of longitudinal travel . . . can be supplied with booms and columns of different lengths. Transverse travel of boom and clearance under it range from 8 to 12 feet, depending on size of machine.

612E-LW

LEWIS

WRITE TODAY FOR COMPLETE DETAILS AND PRICES

THE LEWIS WELDING & ENGINEERING CORP.

70 Interstate Street • Bedford, Ohio

Circle No. 17 on Reader Service Card.

You'll want to see—

the latest in...

HELIARC WELDING
SIGMA WELDING
UNIONMELT WELDING
AUTOMATIC TRACER-GUIDED MACHINE CUTTING

Visit the LINDE *display at the 1955 Welding Show in Kansas City, Missouri, June 8, 9, and 10*

Whether your fabricating needs are for a small shop or for huge production lines—on carbon steel, complex alloys, or non-ferrous materials — LINDE has a high-speed, cost-saving electric welding process for every job...And if your problem is precision cutting of sheet or plate materials – LINDE oxy-acetylene cutting machines may be the answer. LINDE *representatives* will be glad to answer your questions and demonstrate or explain the finest in metal fabricating and cutting.

Be sure to see all demonstrations — straight polarity sigma welding of carbon steel plate, HELIARC welding of pipe, and shape-cutting with an automatic tracer.

Make a note to visit the LINDE display —space number 218.

Linde Air Products Company
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities

In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited, Toronto

The terms "Linde," "Heliarc," and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.

Linde Trade-Mark

Circle No. 13 on Reader Service Card.

You Can't Beat ATLAS Quality

The modern Atlas plant is devoted exclusively to building the finest weld cleaning tools in America. There are models to suit the man and every type work. If you haven't tried Atlas you don't know what a difference "balance and feel" can make in production and quality of work. They can take it.

ATLAS WELDING ACCESSORIES CO.

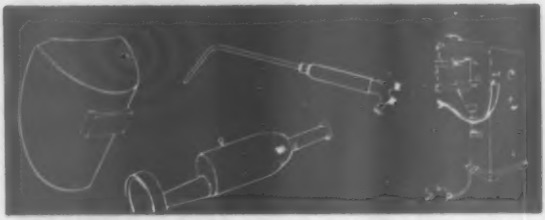
707 E. LEWISTON AVENUE, FERNDALE 20 (DETROIT) MICH.

ASK YOUR WELDING SUPPLY DEALER TO SHOW YOU THE ATLAS LINE

B-1 "Re-Bit" Dual Tool 10½" 16 oz.
B1-W "Re-Bit" Dual Tool 10½" 15 oz.
Model A Dual Tool 10½" 17 oz.
Model AW Dual Tool 10½" 16 oz.
Model E-1 "Re-Bit" 9" 12 oz.
Model E1-W "Re-Bit" 9" 10 oz.
Model F-1 "Re-Bit" 10" 16 oz.
Model F1W "Re-Bit" 10" 14 oz.
Model G Chisel & X-Chisel 9" 14 oz.
H-9" 14 oz. L-10" 17 oz. Cone & Chisel
Model I Chisel & X-Chisel 9" 13 oz.
J-9" 13 oz. N-10" 15 oz. Cone & Chisel
LCP-10" 17 oz. HCP-9" 14 oz. Cone & X-Chisel
Model K Cone & X-Chisel 10" 17 oz.
JCP-9" 13 oz. NCP-10" 15 oz. Cone & X-Chisel
Model M Chisel & X-Chisel 10" 15 oz.
Models WH: 10-20-30 12" 14 oz.
Model C "Re-Bit" Chisel & symbol
Model CW "Re-Bit" Chisel & symbol
Models OCC—OCP—ODC 9½" 10 oz.

Circle No. 3 on Reader Service Card.

index to products advertised this month



This index, compiled for easy reference represents only those products advertised in this issue about which information was available prior to our closing date. All of our advertisers, however, are prepared to supply full particulars regarding their equipment, services and materials.

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get these plus values

"O" RINGS — FREE-FLOW MIXING CHAMBER — NEEDLE VALVE FLAME ADJUSTMENT

MANY OTHER QUALITY FEATURES

choose Gasweld

WELDING TORCHES

An outstanding all-round performer.

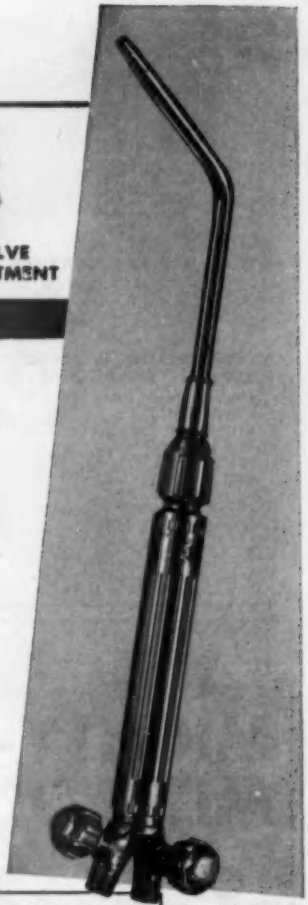
New "O" Ring Assembly permits fast change from welding to cutting attachment. Hand tightening alone gives perfect, gas-tight seal.

Gasweld Needle Valve Adjustment eliminates possibility of flame fluctuation—even when torch is bumped or jarred.

Famous Free-Flow Mixing Chamber virtually eliminates flashback.

Solid seamless ribbed brass handles, precision-balance and rugged, long-life construction are other quality features that make Gasweld your best torch buy.

See the Model WG-25 and the complete line of Gasweld torches at your dealer's. Or write for full information.



Model WG-25 Welding Torch

VISIT US AT BOOTH 125

WELDING SHOW

MUNICIPAL AUD.

Kansas City, June 8-10

FREE CATALOGS LIQUID manufactures a complete line of both Gas and Arc welding equipment and supplies. Send for your Gasweld and Arc Welding catalogs today.

LIQUID also produces Oxygen, Acetylene and other commercial gases including CO_2 in all its forms—Gas, Liquid and Solid (dry ice) for industrial use.

Liquid

THE LIQUID CARBONIC CORPORATION
Industrial Gas Division
3100 South Kedzie Ave., Chicago 23, Illinois

West of the Rockies: STUART OXYGEN CO., Los Angeles
In Canada: IMPERIAL OXYGEN, LTD., Montreal

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A MIGHTY-MITE OF A GRINDER

Model J
¼ H.P. at 4½ lbs. net wt.

Same quality-engineered features as large models. Drives 4" hub wheel so average man can't stall with one hand. Not a toy but a real production grinder for hard-to-get-at places.

DALLAS J&H PRODUCTS CO. TEXAS

J. & H. PRODUCTS COMPANY
DALLAS 1
TEXAS

Please send Literature (No. 215) & Price List
NAME .....
ADDRESS .....
CITY ..... STATE .....

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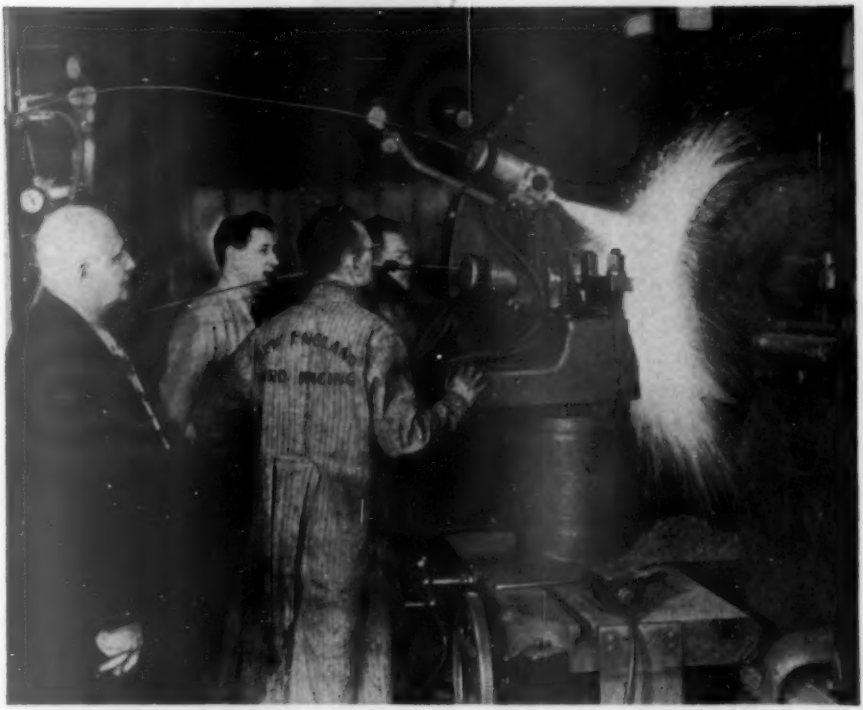


Photo courtesy New England Hard Facing Co.

build up smoother, more uniform surfaces with CRUCIBLE metalizing CORE WIRE...

For consistent uniform spray... quick build-up and smooth, sound deposit, you can depend on Crucible *stainless steel* metalizing core wire. For, like all of Crucible steels, it's *prescription-made* for the job. And it's backed by over a half century of *special purpose* steel-making experience.

Crucible metalizing wire is made in a wide variety of stainless steel grades for corrosion-, abrasion- and heat-resisting applications. There's a grade for every need. Next time you require metalizing wire, call your nearby Crucible warehouse. And for your free copy of our new booklet on *Rezistal* stainless steel wire, write *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

Circle No. 22 on Reader Service Card.

Ni-Rod gave this lathe a new lease on life

"As good as new" reports Steers Sand and Gravel Corp. on the Ni-Rod weld that has kept this 20-foot lathe in operation since a 1946 breakdown. Three passes and three pounds of 5/32" Ni-Rod joined the cast iron hub to steel face plate after 300°F. preheat. Hub and weld support 250 lbs. in the face plate and chuck alone.

See the weld in this picture? It joins a steel plate to a cast iron hub. It was made in 1946 with Ni-Rod®. And has proved 100% satisfactory.

Success stories like this show how Ni-Rod fills the need for *a general purpose electrode for welding cast iron.* Even welders of limited experience get sound, machinable welds with Ni-Rod.

Today, most welders prefer Ni-Rod's new companion electrode, Ni-Rod "55"® for welding cast iron to steel. It gives even greater strength in these specialized jobs: welding heavy sections, high phosphorous irons, Ductile Iron, Ni-Resist®, high-strength cast irons, and joining cast iron to other metals.

If you work with cast iron, Ni-Rod and Ni-Rod "55" can help you simplify cast iron assemblies, save worn or damaged parts.

Ni-Rod and Ni-Rod "55" are easy electrodes to handle. Usually they require no preheat or postheat. And you can always expect sound, machinable welds.

Write today and ask for our FREE FOLDERS ON NI-ROD AND NI-ROD "55."

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street New York 5, N. Y.

INCO TRADE MARK

WELDING PRODUCTS
Electrodes • Wires • Fluxes

See Inco's demonstration of NEW welding products. Visit BOOTH 109 at the Municipal Auditorium Kansas City, Mo., June 8-10

WELDING SHOW

Circle No. 24 on Reader Service Card.

NOW! A WATER-COOLED HELIWELD HOLDER

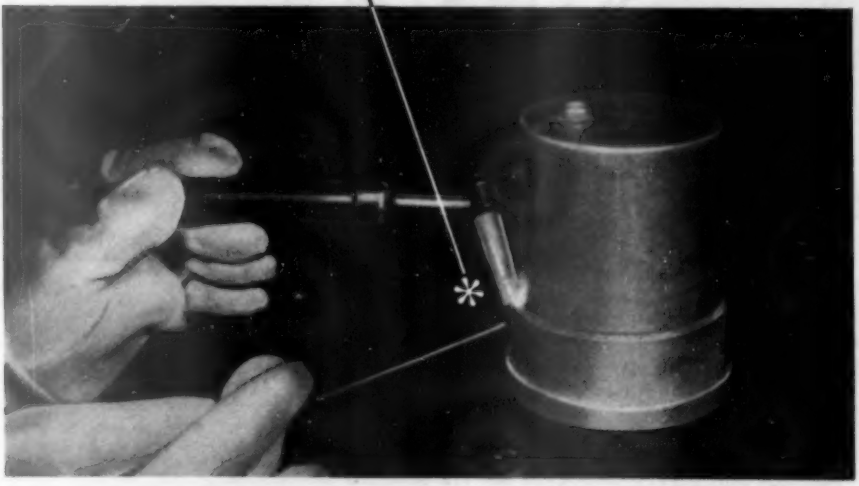
—THE AIRCO H12A

for only

$58.30

This brand-new, water-cooled Airco Heliweld holder gives you quality welds in thin-gauge aluminum, stainless steel, magnesium and copper alloys with ease and convenience . . . and at a highly attractive price. Weighs only four ounces and is 7½ inches long. Continuous duty rating of 125 amps AC or DC. Ideal for long-run jobs, and for welding in tight corners. Gastight "O"-ring seals in the nozzle and cap assembly. A full selection of collets and ceramic nozzles . . . no arc-shorting in confined areas! Price includes holder, collet, nozzle, cap assembly and cable assemblies . . . with no sacrifice in usual high Airco quality.

See your Airco dealer, or write today for Catalog 2300, "Airco Heliwelding Equipment."



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Circle No. 23 on Reader Service Card.

METAL ARC WELDING of manganese bronze and yellow brasses without preheat is said to be possible with a new electrode described in Bulletin W-26 published by Ampco Metal, Inc. Identification, chemical and mechanical data are given. **Circle No. 111.**

BOTH AC AND DC welding from one machine is the advantage of new welder described in Bulletin 1343 of Lincoln Electric Co. Full facts are presented on company's new "Idealarc" unit. **Circle No. 112 on Reader Service Card.**

PORTABLE FLAME CUTTING machine is featured in colorful bulletin issued by Burdett Oxygen Co. Cutaway drawing shows machines components. Straight line, bevel, circle and shape cutting are all described. **Circle No. 113 on Reader Service Card.**

HOW TO BRAZE is subject of Air Reduction Sales Company's 24 page manual. Book contains over twenty tables and illustrations; tells proper procedure for silver brazing, alloy selection, design of joints and cleaning. **Circle No. 114 on Reader Service Card.**

A PORTABLE, SELF-CONTAINED INDUSTRIAL X-RAY UNIT is featured in colorful material released by Balteau Electric Corp. Photographs are supplemented with complete technical information. Optional equipment is covered. **Circle No. 115.**

SAFETY EQUIPMENT from goggles to air analysers is presented in 64 page illustrated catalogue prepared by Willson Products, Inc. Special section describes helmets, hats and air supply apparatus for welding application. **Circle No. 116 on Reader Service Card.**

WHAT IS HARD FACING? is the first topic in a brochure prepared by Rankin Mfg. Co. Other subjects covered are materials available, methods of application, application procedure and advantages of "Ranite." **Circle No. 117 on Reader Service Card.**

SPECIAL PURPOSE RESISTANCE WELDERS ranging from television tuner welders to chair welders are spot lighted in a color printed folder prepared by Banner Mfg. Co. Single and multi-gun units are illustrated. **Circle No. 118 on Reader Service Card.**

"I'VE SURE CUT MY COSTS" is the title of an illustrated folder issued by Hobart Bros Co. to display recently introduced arc welding machines. Cutaway photos show construction details, while simple charts offer full specifications. **Circle No. 119.**

WELDING ALLOYS, applications, property breakdowns, size and weight specifications are covered in a booklet prepared as a weldshop aid by Welding Materials Mfg. Co. Charts and simply written descriptive material tell how to use different alloys. **Circle No. 110.**

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Once you've tried

CADDY

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It's the coolest, lightest, most durable electrode holder on the market.

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Circle No. 25 on Reader Service Card.

LATEST COPPER AND COPPER ALLOY SPECIFICATIONS is the subject of a tabbed 24-page ready reference manual. Published by American Brass Co., the handbook presents 10 sets of specs issued by various national engineering societies as well as those of the Army and Navy. One section lists most commonly used alloys. Another lists specifications in numerical order with a brief description of the material as to alloy, grade, type, temper and anneal. **Circle No. 120 on Reader Service Card.**

A UNIVERSAL RAM-TYPE WELDING FIXTURE is pictured in full detail in a colorful catalog sheet released by C. B. Herrick Mfg. Corp. Included are complete specifications and operating characteristics as well as information on optional equipment. **Circle No. 121 on Reader Service Card.**

IMPORTANT DATA FOR USERS OF BLASTING EQUIPMENT together with description of air and sandblasting nozzles are offered in Catalogue 27A issued by American Wheelabrator and Equipment Co. A discussion of controlling compressed air consumption, tabular data on minimizing nozzle wear, and listings of pressure blast hose fittings are included. **Circle No. 122.**

QUICK CUTTING WHEELS for weld shop usage are pictured in a color-printed folder which gives sizes, grit information, suggested operating speeds and other data. Published by Carborundum Co. **Circle No. 123 on Reader Service Card.**

BRAZING, SOLDERING AND HEAT TREATING MACHINES for semi- or fully automatic operation are headlined in an illustrated, color-printed folder available from Gas Appliance Service, Inc. Turntable and conveyor-type units are described. **Circle No. 124.**

MOLYBDENUM'S properties and uses are explained in a 20 page bulletin available from Sylvania Electric Products, Inc. Featured in the brochure is a colorful chart which shows how molybdenum is manufactured from oxide to finished product. **Circle No. 125.**

Got Flame Cutting Problems?

Small or large . . . OHMSTEDE'S time and labor saving flame cutting machine gives you faster, easier cutting at lower cost. Here are 8 big reasons why OHMSTEDE is your best buy.

- Unlimited variety of shapes
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- Operates on either alternating or direct current
- Delivered with base—no extras required
- Sealed ball bearing construction
- Enclosed motor
- Low initial cost

WRITE FOR COMPLETE SPECIFICATIONS.
ASK FOR BULLETIN 42-52.

OHMSTEDE MACHINE WORKS

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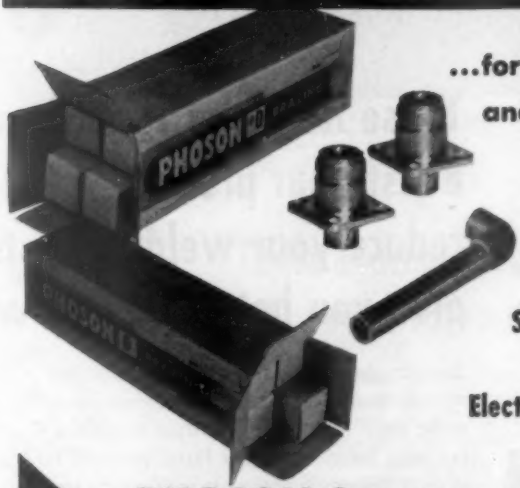
PHOSON-0 PHOSON-6

These Two *United* Alloys



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Industry's most popular alloy choice for brazing closely fitted copper and brass joints where exceptionally low temperature is not an important consideration.

Highly Efficient! Most Economical!

Use Phoson-O for brazing joints of consistently uniform clearances — quickly, safely, surely!

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For really low temperature brazing and complete control of alloy flow . . . where maximum ductility and varying joint tolerances are key factors.

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These Two Alloys For All Your Copper and Brass Joining!

Two Good Reasons Why PHOSON BRAZING ALLOYS Are Busier Than Any Brazing Alloys In The Country!

SEND FOR SPECIAL PHOSON FOLDER NOW!

Wherever Metals Are Joined, Keep Them — Permanently United

UNITED WIRE AND SUPPLY CORP.

Brazing Alloy Division

PROVIDENCE 7, R. I. • OFFICES IN PRINCIPAL CITIES

Circle No. 37 on Reader Service Card.

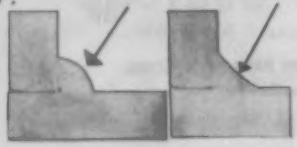
NEW NCG® SUREWELD®
IRON POWDER
ELECTRODES

DO YOU USE E-6012 OR E-6020 FOR FILLET, LAP OR FLAT BEVEL WELDING?

A. Length (12.3") of ¼" fillet weld deposited by 3/16" Sureweld "24" electrode in one minute.

B. Length (9.8") of ¼" fillet weld deposited by next larger size—¼"—E-6012 electrode in one minute.

Typical cross-sections of welds made (A) by ¼" E-6012 electrode and (B) by 3/16" Sureweld "24" electrode. Note in (B) the smooth flat profile, the absence of undercutting and the deep penetration obtained with Sureweld "24".



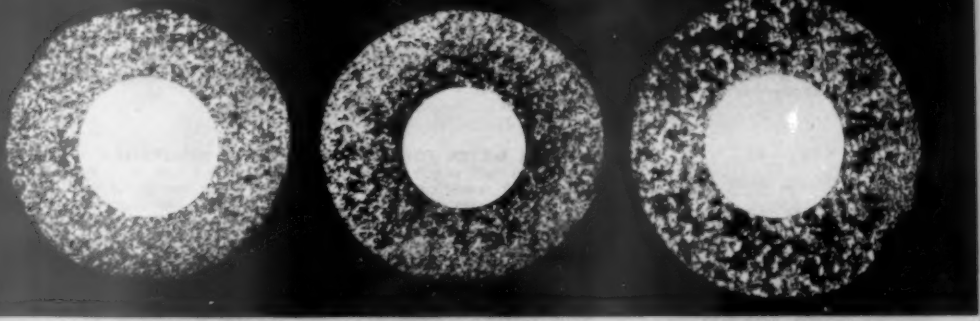
These new electrodes can boost your production welding, reduce your welding costs, give you better quality welds

Tests made under normal shop conditions show that the new *Sureweld* iron powder electrodes can lay down 25% more metal in a given time than E-6012 or E-6020. This is not only because of their faster burn-off rate but because of their higher efficiency. In making the tests, a 3/16" *Sureweld* "24" electrode was used as against *the next size larger*, E-6012. The 3/16" *Sureweld* rod produced 12.29 inches of fillet weld in one minute as against 9.78 inches for the ¼" E-6012. Cost per one foot of weld was $0.0756 for *Sureweld* "24". Cost per one foot of weld was $0.0818 for E-6012. These cost figures do not include savings from the use of lower amperages nor the savings from easier clean up, less grinding and finishing and the almost total elimination of undercutting.

Sureweld iron powder electrodes also produce *better welds* —with higher impact values and greater crack resistance, deeper penetration and remarkable freedom from porosity.

Two types of these new electrodes are available: *Sureweld* "24" (E-6024) for production welding applications in which E-6012 is now used; and *Sureweld* "27" (E-6027) for E-6020 applications.

Write—for new descriptive bulletin for a free demonstration or buy and try Sureweld Iron Powder Electrodes yourself at your authorized NCG dealer or NCG office

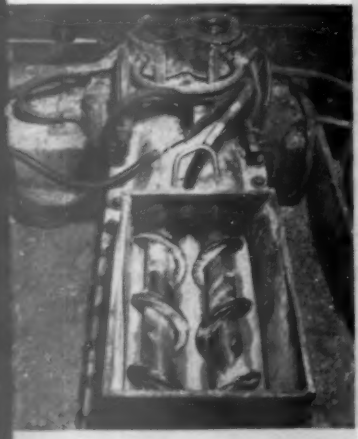


Cross-section of Sureweld "24" electrode. Note the even distribution of iron particles and other coating constituents.

Cross-section of a well known brand of iron powder electrode. Compare the uniformity with that of the Sureweld electrode.

Cross-section of still another well known brand of iron powder electrode.

DO YOU USE IRON POWDER ELECTRODES NOW?



These macrophotographs reveal facts vital to your welding profits

The one chief reason for using iron powder electrodes is to increase welding production and profits. But your success in the use of iron powder electrodes depends principally on how uniformly the iron powder particles and other ingredients are mixed in the coating. When the ingredients are mixed evenly, burn-off proceeds uniformly, evenly and swiftly; and you get maximum welding production.*

The macrophotographs shown above have been made by an independent and impartial testing laboratory of random cross-sections of a *Sureweld* iron powder electrode and two other well-known brands of iron powder electrodes. These magnified cross-sections reveal the distribution of iron powder particles and other constituents in the coating of the three brands of electrodes mentioned.

***NOTE: The welding process is a form of partial combustion. As in the case of all combustion, any man who has ever built a fire knows that "fuel" elements must be evenly distributed if the fire is to burn well and rapidly. But if there is uneven distribution and "dead" spots you have trouble getting the fire started and keeping it going. This is true of coated electrodes as well, especially those with powdered iron added to the coatings.**

Why Sureweld iron powder electrodes always possess complete uniformity

Efficient iron powder electrodes don't just happen. They are carefully planned and carefully made. NCG selects coating ingredients carefully and mixes them carefully. And instead of the conventional hydraulic extrusion equipment which exerts heavy pressure on the entire mass of flux, NCG uses special gear-type extrusion-coating machine which is shown on this page. Large screws feed the flux into synchronized gears that transfer the flux in small amounts to the extrusion chamber. *And only at the point of actual coating and extrusion is high pressure used, when it is too late to cause segregation of the flux ingredients.* Thus the uniformity arrived at in the flux-mixing machines remains unimpaired.

NCG®

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MAGNESIUM PLATE AND SHEET, characteristics and sizes, gauges and weights are described in an illustrated folder published by Brooks and Perkins, Inc. Another 8-page booklet gives strength and stiffness characteristics of structural magnesium shapes and forms. **Circle No. 126 on Reader Service Card.**

A MICROHM METER FOR TESTING SURFACE RESISTANCE of metals prior to spot welding is shown in literature issued by J. W. Dice Co. Exact specifications and operating data are provided. Blue prints are given for a suggested test jig used for checking resistance of aluminum sheet. **Circle No. 127 on Service Card.**

"FLAME CUTTING WITH PROPANE" is the title of an interesting pocket handbook which gives fundamentals of flame cutting. How to select gas is discussed from point of view of application, safety, cost. Worthwhile reference material. Flame Cutting Equipment Co. **Circle No. 128 on Reader Service Card.**

A PORTABLE BAND SAW BLADE WELDER with built-in grinder is featured in a colorful catalog sheet issued by Kasson Die & Motor Corp. Construction details and operating information are given. Sheets are illustrated and properly sized for the weld shop catalog. **Circle No. 129 on Reader Service Card.**

NEW METAL FINISHING TOOL. Complete information on deburring, polishing, blending grind lines, scale and slag removal before and after weld cleaning with both regular velocity and high velocity Pressure Blast wet-blasting equipment is now available in a new, illustrated, 8-page booklet issued by the Cro-Plate Co., Inc. "Before and after" photos show actual case histories, and sections of booklet are devoted to automatic, high-production machines, abrasives and Metal-Gard, a new rust preventative to be used after wet blasting operations. **Circle No. 130 on Reader Service Card.**

cut weld cleaning time by 85%

Throw away your cold chisel and whisk off weld spatter with a dry rag! Protect-O-Metal spatter-proofing compounds make weld cleaning a breeze. Improve your welds at the same time . . . P-O-M compounds quiet the arc, improve fusion and electrode operation, prevent oxidation and annealing scale, cause no porosity. No smoke, odors, or fumes.

P-O-M No. 2. Non-inflammable, non-toxic, water-soluble paste. Inorganic. Thin before applying and start welding at once. $3.25 per gallon, f.o.b. Dayton.

P-O-M No. 8. Rust- and corrosion-resistant resin base compound. Comes ready to use. Safe for all metals. Good paint primer; permits outdoor storage of sub-assemblies. $3.30 per gallon, f.o.b. Dayton.

MONEY-BACK TRIAL OFFER
Order a trial gallon of each today for testing in your shop. We'll cancel the bill if you're not satisfied.

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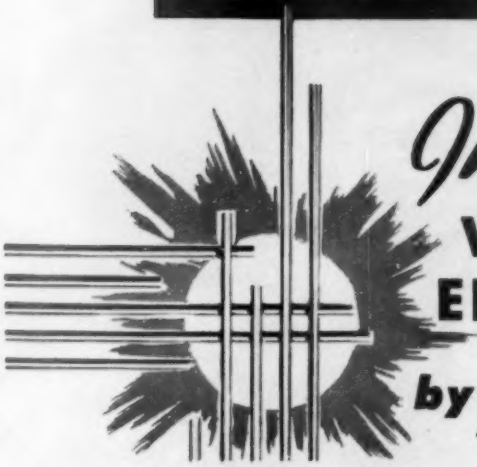
ANNOUNCING—



A NEW, *Improved* WELDING ELECTRODE by ELMET

ELMET Efficiency Electrodes are manufactured by North American Philips, one of the pioneer tungsten producers with more than 20 years experience in this highly specialized field.

Their uniformity of properties, dimensions and characteristics prevent loss of time due to readjustments of equipment and voltage.

Furnished in cleaned finish and centerless ground finish. Available in packages of 10 in all standard diameters from .040" to ¼" and from 3" to 18" in length. North American Philips Company, Inc., Elmet Division, Lewiston, Maine.

Try New ELMET Electrodes Now! Use Coupon Below

Free Folder

Don't delay! Do it today! Send the coupon and get the facts about ELMET Efficiency Electrodes.

Distributor Inquiries Invited

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Please send me ☐ Free Folder and

☐ *Price on* _____ *Elmet Electrodes.*
(quantity, size, finish)

Name_____

Street_____

City_____ State_____

☐ *Send me your distributor proposal.*

Circle No. 31 on Reader Service Card.

America's most complete line of arc-welding equipment and electrodes.

AC WELDERS
Sizes up to 625 amps. All connectable to 220 or 440 volts—550 volts on request.

POSITIONERS
Capacities from 2500 to 36,000 lbs. — remote-control and hand-operated models.

AC/DC WELDER
The first machine to give you either AC or DC current at the flip of a switch.

Welder using Solar-designed Circumferential-type Butt Welder. Powered by treadle-operated P&H DC Rectifier Welder

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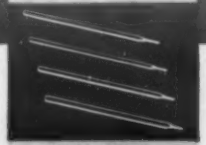
DC RECTIFIER WELDER
Four sizes — 200, 300, 400, and 500 amps.



ELECTRODES
For mild steel, cast iron, "hard-to-weld" steels, stainless steels, hard surfacing.

Butt-welding .0015" stainless now an every-day job at Solar Aircraft

... with the ease of starting, stable arc, and instantaneous control of P&H Dial-lectric Welders

WELDING a tiny diaphragm of ultra-thin .0015 stainless steel could be a real problem. But Solar Aircraft at San Diego does this delicate job with standard P&H welders — in fact, the same welders it uses for fabricating 28-foot diameter, wind-tunnel expansion joints.

Here's why P&H Welders are "naturals" for precision welding. They start easily and instantly — touch the work and you're welding with a strong, steady arc. You get famous P&H Dial-lectric Control — wide range and *instantaneous* heat selection with just the twist of a radio-type knob or pressure on a foot treadle. And when you set a P&H for a certain current level, that's exactly the current you get until you decide to change it. There's no fading — and no adjustment is required as the machine warms up.

You're set for almost any fabricating job that comes along with P&H Arc Welders. Get the full story from your P&H representative or distributor, or write us.

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2884

the P&H *Line*

P&H welding equipment is manufactured and sold in Canada by REGENT EQUIPMENT MANUFACTURING COMPANY LTD., 455 King Street West • Toronto, Ontario, Canada

Circle No. 32 on Reader Service Card.

1 Inert gas back up in gas-chamber fixture is carefully controlled while root bead is made. Finished weld is even, has smooth appearance.

"control over application of important root pass is integral part of new process, not dependent on skill of the operator"

2 Remaining passes, including final reinforcing beads are made with manual arc welding. Grinding wheels finish weld before inspection.

USE OF INERT GAS BACK UP SIMPLIFIES PIPE FABRICATION

A NEW technique for welding piping now assures complete penetration without the use of backing rings. First used commercially in shop fabrication and field installation of high pressure, high temperature stainless steel power piping, the process is now being applied successfully to other applications.

Called K-Weld, the process uses inner and outer inert-gas shielded arc welding to apply the initial or root bead to the joint being made up. By accurately controlling the gas pressure inside the pipe, the weld is deposited with a highly uniform internal contour. By varying the gas pressure, the inner surface of the bead can easily be made slightly convex, flush or even concave — although the latter would rarely be used since it results in reduced weld strength.

3 Welded joints are stress relieved by automatic, high-powered induction heating units. Thermocouples measure temperatures accurately.

Weld Any Metal

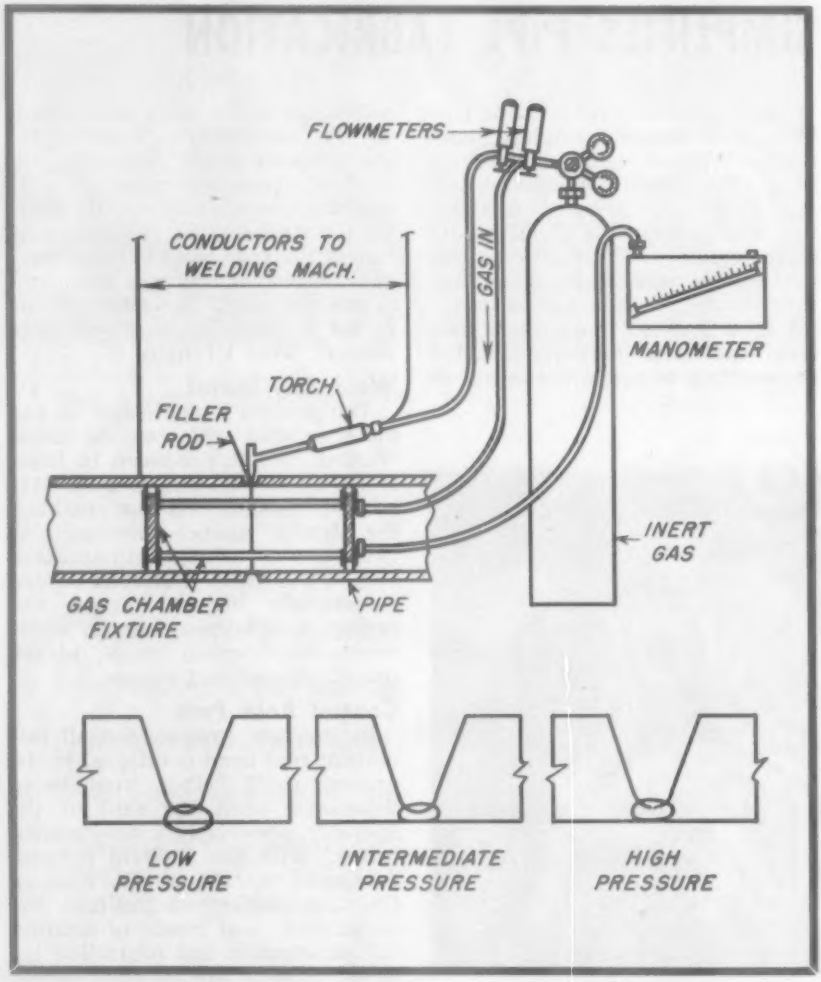
The process is applicable to any metal or alloy which can be fusion welded. Welds produced in heat-treatable steels such as SAE 4130 have withstood, without cracking, the drastic quench necessary to produce yield strengths in excess of 150,000 psi. Other materials welded successfully include carbon and carbon molybdenum steels, chromium-molybdenum steels, nickel, monel, inconel and copper.

Control Root Pass

In the new process, the all important root bead is integral to the process itself rather than being dependent upon the skill of the operator, previously a determining factor. With the K-Weld process, developed by the M. W. Kellogg Co., a subsidiary of Pullman Incorporated, root beads of assured full penetration and controlled internal contour are secured. These uniform root beads are free of undercutting and have a high degree of root bead reinforcement.

Welds obtained by this process

meet all x-ray, physical and mechanical requirements of the A.S.M.E. Boiler Code and other codes and specifications. Tensile, bend, impact and torsion tests have demonstrated excellent properties. Complete metallography has revealed there is no tendency for cracking or undercutting the edges of the inside bead.



4 Details of portable gas-chamber fixtures are shown (above). How varying pressures control shape of interior of weld surface is illustrated (below).

You don't just buy an x-ray machine. You must know . . .

What To Look For In X-Ray Equipment

by JOHN J. LUDWIG

CAREFUL investigation of all production and inspection problems should precede selection of an x-ray unit. There are many factors to consider, among them thickness and density of material to be inspected, shape and related thicknesses of parts, rate of inspection needed, sensitivity desired and economic factors involved.

The first factor, thickness and density of the part, is fairly simple to evaluate. In the voltage range of from 10 to 5000 kv, thicker material demands higher voltage x-ray equipment for fast practical penetration. Also the density of material per unit thickness affects penetration. Therefore, you must consider the density of the material you want to inspect, as well as its thickness before arriving at the optimum voltage needed for a particular inspection problem.

Establishment of a yardstick for measuring minimum and maximum limits or penetration for any one x-ray unit is somewhat difficult and likely to be confusing unless

"With X-ray units it sometimes pays to hire a cannon

all elements used in establishing the data are understood.

Used in production, a machine may have a range of ½ to 5" of steel. The same machine, however, used in experimental work, may have a range up to 8" of steel because longer exposure times can be tolerated. These figures are arrived at on a basis of accepted standards of sensitivity techniques and time values.

The second important factor in determining the x-ray unit best suited to shape and related thicknesses of the part to be radiographed. If, for example, a part is so shaped that the x-ray beam must penetrate three or four widely varying thicknesses in the same exposure, the need for an x-ray unit which affords a wide latitude can be easily understood.

Latitude

Latitude simply means the ability of an x-ray unit to produce an easily read radiograph of adjacent variations of thickness on the same film, using the same exposure, without resorting to difficult, time-consuming blocking. In the range of from 10 to 5000 kv, latitude is a function of voltage . . . within those limits the higher the voltage of the x-ray unit the wider the latitude.

This factor is quite important because, even though the total thickness of the part to be inspected is well within the range of a lower-voltage unit, variations in thickness may make the selection of a higher voltage unit of more latitude almost economically obligatory.

Rate of Inspection

Naturally, the rate of inspection will receive very careful scrutiny before an x-ray unit is decided upon. If it demands a unit of extra large production capacity, this factor may outweigh all other considerations. Take the example of one typical installation.

Giant 2,000,000 volt x-ray machine checks weld in pressure vessels at Barberton, Ohio, plant of Babcock & Wilcox, Inc. Contrast it with . . .

to shoot a canary . . . "

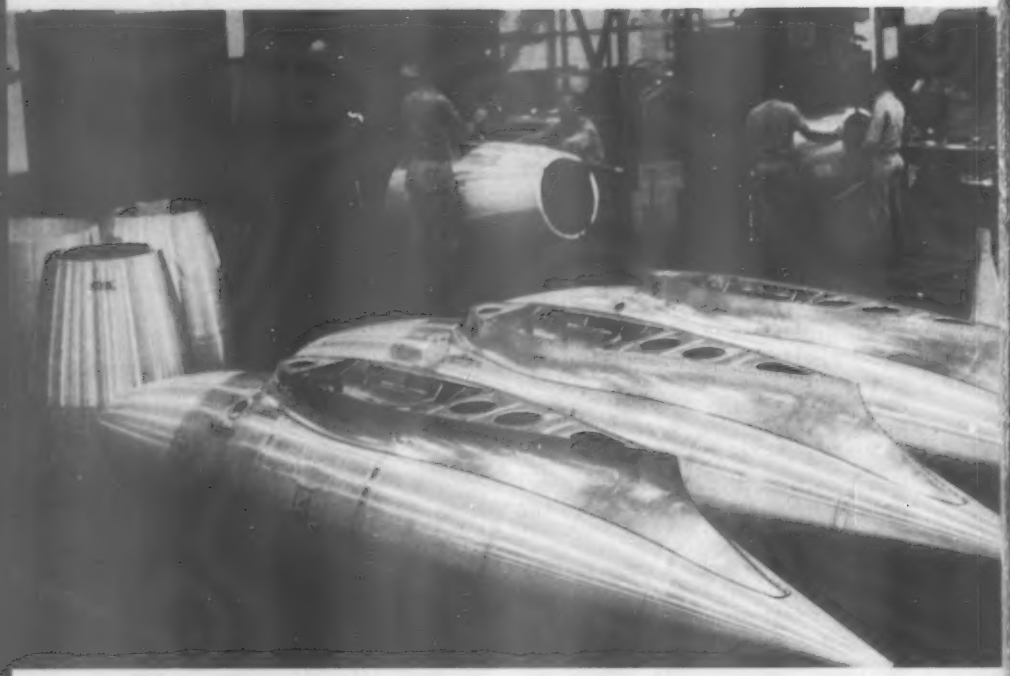
In this case the rate of inspection needed was 300 units a day. Articles to be inspected had a maximum thickness of 1½". However, after considering the factors involved, application specialists recommended a million volt machine. Management was reluctant to purchase a machine with million-volt penetration to examine 1½" of steel. But after it was shown that the large machine could complete an entire day's inspection in 10 individual exposures totaling 40 minutes . . . at a tube cost of only a few dollars a day . . . and could do this by inspecting 30 parts per exposure, management agreed to the purchase.

This was an actual case history which, on the surface, looked as if the company was "hiring a cannon to shoot a canary." In reality, the company was carrying out its inspection requirements in the easiest, most economical manner pos-

High voltage cable is attached to portable industrial x-ray unit by author. Mr. Ludwig is a member of the X-ray Department of General Electric Co.

(Story Continued on Page 106)

Portable x-ray unit that can be carried to work by small truck. Operates at 45,000 to 175,000 x-ray tube voltages.



Ryan Spot Welds Aluminum Tanks

HUGE wing tanks for Boeing KC-97 Stratofreighters are being spotwelded by Ryan Aeronautical Co. Tanks, which must carry hundreds of gallons of aromatic fuel at 350 miles per hour, must withstand every G-load, sloshing impact and vibration caused by flight maneuvers. The lightweight tanks must be immune to leakage and damage under these torturous conditions.

Boeing outlined tank requirements including capacity, dimensions and contours. Given these, and Air Force requirements, Ryan engineers designed the tank structure. Meeting rigid specifications created problems in fabrication.

Greatest of these was: How to make the tanks strong enough to meet the terrific demands, and yet simple and light. Then, eliminating components to keep weight down meant designing larger sections. This posed problems in getting access for welding. It also re-

ABOUT THE PHOTO

Giant spot welders fabricate huge wing tanks for Boeing KC-97 Stratofreighter. Machines can make up to 200 welds per minute.

quired closer dimensional tolerances because larger sections could magnify slight errors.

Largest ever built, B-17 wing tanks were designed to consist of a few huge, circular sections joined by light weight spot welding. This permitted elimination of all longitudinal members, only simple splice rings being used at all welded joints.

Thousands of Spot Welds

Thus, KC-97 containers consist of only five major circular sections joined with thousands of spot welds. Bolting rings are used on three joints which are designed to separate for shipping purposes. Only two compact bulkheads are used. These are lightweight assemblies which transmit loads to the wing fittings. The structure i skin-stressed throughout its envelope of 61S aluminum alloy.

First step in fabricating is to roll the 61S alloy into circular sections, slightly undersize in diameter, and then weld the longitudinal seams on automatic inert arc machines. The resulting butt weld is almost undetectable because the metal thickness at the joint is the same as that of the parent metal. This provides a seam which can be run through resistance welding machines without special preparation.

Heat Treat Aluminum

Sections are then heat treated in an elevator-type electric furnace which brings them up to 980°F and quickly cools them with a cold water spray. This makes parts more ductile for subsequent forming and stretching operations.

Components are then stretched to exact diameter on expanding mandrels. Close precision, up to .025-inch on diameter, is obtained without difficulty. Sections are next aged by heating to 350°F for eight hours in a gas-fired oven. This hardens them and raises their yield and ultimate strength to specified levels.

Tank sections are then trimmed to exact length. Filler cap holes and other openings are blanked out in a hydraulic press. Components are then ready for spotwelding. This is done on a bank of eight huge spotwelding machines which can make up to 200 spotwelds per minute, "fire" 120,000 amperes of current and exert 11,000 pounds of electrode force. Machines are capable of handling large sections because the electrode arms are 60-inches long and 62-inches above the floor.

Tank sections are joined on these machines with circumferential

"Spot welded tanks are light, strong and gas-tight"

welds which attach the components of the splice rings. Each joint is given two rows of seamwelds. All work is performed with wheel-type electrodes. Roll spotwelds are made on 1½-inch centers with electrode wheels stopping for each weld in brief, intermittent pauses. Seamwelds are a series of overlapping spotwelds, made while the wheels are continuously rolling. Result is a strong, gas-tight joint which is extremely light in weight.

Aluminum Must Be Clean

Because of its good ductility, 61S aluminum is an excellent alloy for spotwelding. However, it must be thoroughly cleaned of all grease, soil and oxides before welding. Slight amounts of soil and oxide films can alter electrical resistance of the skins, causing temperature rises and burnthrough of the metal.

Ryan has developed a cleaning agent which removes all soil and oxides with smooth uniformity. Daily records show that surface resistance is running between 10 and 15 microhms—well below the 50 microhm limits required. Sheets are welded within 24 hours after cleaning because the oxide film reforms on aluminum within a relatively short time after the metal is exposed to air.

Each tank section is pressure tested, individually, to show that it is gas-tight. No sealing compounds may be used. In special fixtures, sections are clamped shut with rubber-faced enclosures and pumped full of compressed air. Leak detecting compounds are sprayed on the exterior to disclose the slightest air leak. When tank is completely assembled, it is suspended in air and pressure tested again for 45 minutes to reveal slight leaks that might not be evident under limit test periods.

Test Tanks Thoroughly

Static tests of the spotwelded structure were carried out by Ryan engineers. Tanks were placed in steel fixtures and tested with varying amounts of fuel by the application of loads in different directions. Required slosh and vibration tests were conducted at Boeing with Ryan engineers in attendance. These tests required that tanks be rocked back and forth through a 30° angle from ten to 16 times a minute for 25 hours. At the same time, the structure was vibrated at a frequency of 90 percent of normal rated crankshaft speed of the KC-97's power plants. Then, the tank was sloshed alone for an additional 15 hours.

Temperature tests subjected tanks to 160°F heat for seven days and minus-65°F temperatures for three days while filled with liquid containing a staining agent.

Manual inert arc welding fabricates components for aluminum wing tanks.

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The match-test dramatizes an idea—same match and same heat can burn the hand or simply warm it, just as your welding torch or arc welder can, in combination with Eutectic "Low Temperature Welding Alloys," join metals without risk of dangerous overheating, distortion, warping and embrittlement. Write for free booklet "How To Overcome Your Welding Problems." (TIS 2268) Eutectic Welding Alloys Corporation, 40-40 172nd Street, Flushing 58, N. Y.

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WELDING ARCS NEWS

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G-E MG WELDERS—200, 300, 400 amps: unique magnetic interactor assures forceful arc.

G-E AC WELDERS—295, 300, 400, 500 amps: popular moving-coil design.

Tests show how G-E rectifier welders provide a stable, easily handled arc, even on difficult vertical welding

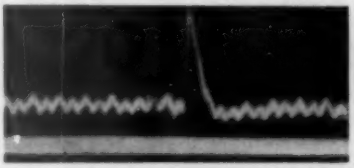
FULL-TIME arc-force control virtually eliminates short-arc sticking

The new G-E rectifier welder offers faster, easier welding . . . improved arc stability. And with G-E **full-time** arc-force control, you can match your job with a soft or forceful arc. Soft arcs are desirable for many jobs, but short-arc work needs a forceful and deep-digging arc.

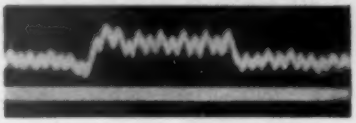
OSCILLOGRAPHIC PROOF (next column) shows how G-E arc-force control provides deep penetration, when you need it: A powerful split-second current surge blasts away the metal drops which pass from electrode to work. Without arc-force control, short circuits are long and at low amperage—and the drops cool. This often causes sticking in short-arc welding.

CONTINUOUS OPERATION is an exclusive feature of G-E arc-force control. Since the capacitor design is self-protecting, there is no thermostat to cut out the arc force when you need it most.

OTHER BENEFITS of G-E rectifier welders are: combination cleaning-cooling fan; special coil-mounting, which reduces wear, noise; easily removable side covers. Efficient moving-coil design is used. Send coupon below for free book. YOUR G-E WELDING DISTRIBUTOR IS LISTED IN YOUR PHONE BOOK UNDER "WELDING EQUIPMENT, GENERAL ELECTRIC CO."



G-E arc-force blasts away short circuit



Lengthy short circuit without arc force

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Section 711-1E, General Electric Co., Schenectady, N. Y.

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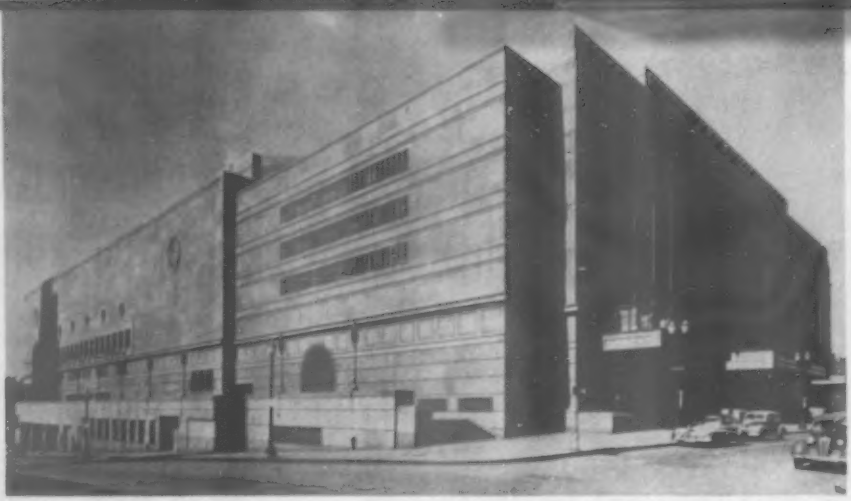

Municipal Auditorium, Kansas, Mo., where biggest welding show will be held.

Record A.W.S. Show at Kansas City

The American Welding Society's get-together at Kansas City, Missouri, June 7-10 will be the most impressive undertaking ever staged by the Society, it was predicted by J. H. Humberstone, president.

Within four days, AWS plans to hold its National Spring Meeting, its annual meeting, and the third Welding and Allied Industry Exposition.

The National Spring Meeting will feature 36 papers, covering all phases of welding and its uses. For the first time, a symposium will be staged on the controversial topic of welding qualification.

Equipment to be displayed will cover every aspect of the field. "The greatest assemblage of welding equipment ever gathered under one roof" is the way AWS officials describe the event. Manufacturers are expected to have top level engineering personnel on hand to answer practical operating questions for visitors.

Papers to be presented will cover such subjects as iron powder electrodes; carbon dioxide for arc shielding; hard surfacing; testing; and resistance welding of commercial molybdenum and titanium. Others will discuss self-fluxing brazing alloys and flame brazing for fabrication of electronic components.

For complete coverage of the industry's most exciting event

. . . read the June issue of INDUSTRY & WELDING Magazine

GENERAL ELECTRIC

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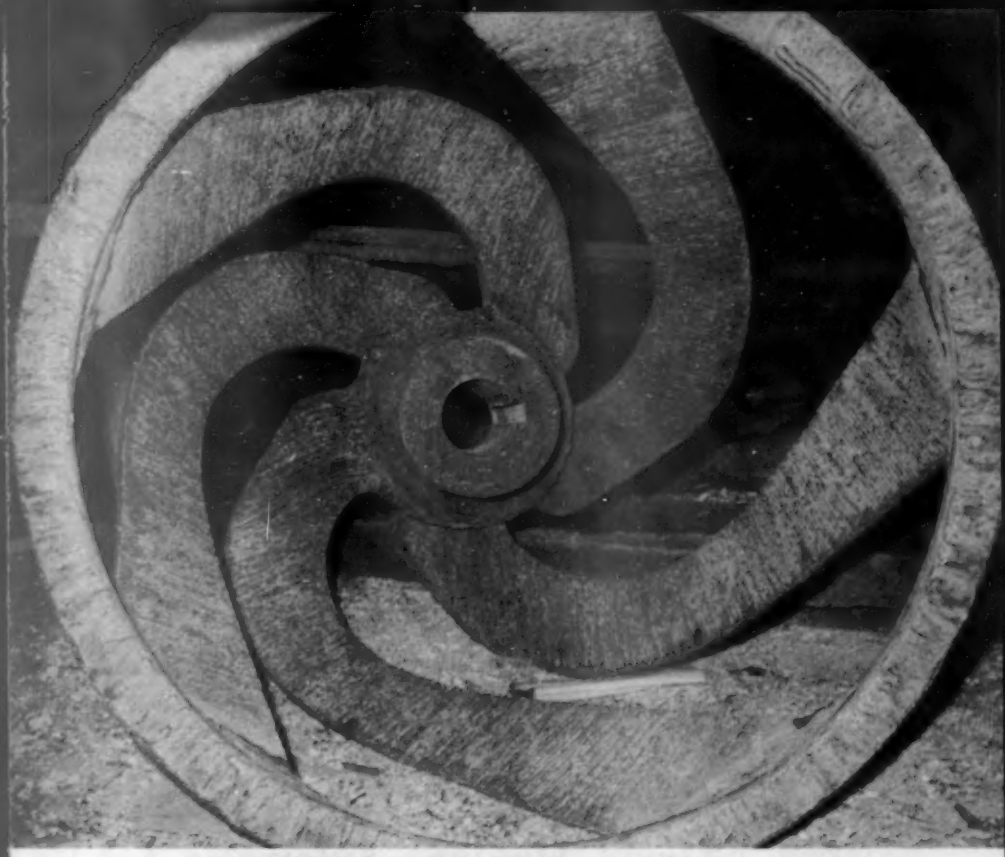

STOODY 21 EXTENDS SERVICE LIFE OF DREDGE PARTS FROM TWO MONTHS TO FULL YEAR

Dredges operated by the W. T. Burton Company, Inc., at Carlys, Louisiana, are used to recover shells from shallow under-water beds; this is the material from which the famous Louisiana shell roads are made. Thousands of tons of highly abrasive sand and silt are handled in the process.

Normally the cutter heads and impellers in such operations last about 60 days; hard-faced with Stoody 21, service life has been increased to a full year. As the hard metal is gradually worn away, the parts are again hard-faced and go back into service. Huge savings result in increased parts life and reduced down-time.

Most heavy equipment subjected to severe abrasive wear and impact can be given similar extended service life with Stoody 21. This material is a high alloy electrode, applied either AC or DC, and its rapid burn-off rate makes it ideal for protecting large surfaces.

Detailed application and procedure information is covered in the Stoody Guidebook that you can get from your Stoody Dealer (consult the Yellow Pages of your telephone book). Your dealer has a free copy waiting for you ... or write to the company.

Entire inner surfaces of cutter head are hard-faced ... approximately 250 pounds of Stoody 21 were required for the cutter head and impeller pictured here. Amount of material will depend on extent of wear. Outer surfaces of cutter blades are hard-faced along cutting edges only.

The entire impeller hub and the leading pressure faces of the vanes are hard-faced with Stoody 21; hard-facing is repeated until side discs are worn out, and hub is then welded into a new unit.

STOODY COMPANY
11924 East Slauson Avenue Whittier, California

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Liquid fluxing units eliminate time-consuming dipping of oxy-acetylene welding and brazing rods into powdered flux. Vaporized flux is carried to torch flame.

Liquid Fluxing, Automatic Set-Up

Oxy-acetylene flame provides metal furniture with strong joints that need practically no cleaning or finishing

by C. J. Engstrom, V.P.
Royal Metal Mfg. Co.

AS far back as 1897 Royal Metal Mfg. Co. of Chicago was turning out the wire chairs that were a familiar part of drug stores and ice cream parlors. Since those days, the company, keeping pace with design changes in the metal furniture industry, has become one of country's largest manufacturers of tubular metal chairs, furniture, desks and shelving.

Oxy-acetylene brazing and welding have played no small part in the company's success. Meticulous attention to choice of correct joining process and selection of proper techniques are the basis of the company's efficient operations.

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Semi-automatic welding set-up utilizes mechanized flame cutting head to make perfect seams in tapered tubes. Manifold system pipes gas to point of use.

Speed Oxy-Acetylene Welding and Brazing

All tubing used is manufactured on an electric resistance tube mill from low carbon cold rolled strip steel. Strip steel is rolled, welded and cut off to standard stock lengths. Tubing is then cut to specific size, formed and fabricated into various metal furniture parts. All tubing is examined in checking fixtures before it is delivered to the welding department.

Use Special Fixtures

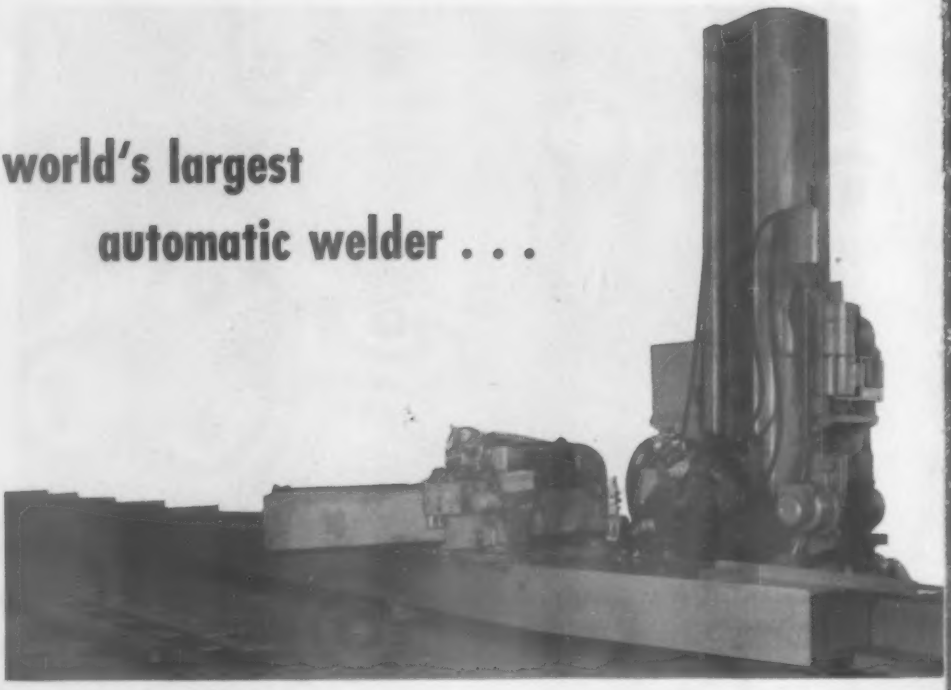
Brazing and welding are done in special fixtures made of heavy bar steel to prevent warping. These fixtures in turn are usually bolted to a welding positioner so that the operator can weld various parts in the most comfortable and efficient position. Parts are held in place by quick-acting toggle clamps.

Brazing is done with lightweight torches, using various size tips. A liquid fluxing unit automatically vaporizes the flux carried to the torch flame, and eliminates the time-consuming operation of dipping rod in powdered flux. Low fuming manganese bronze brazing alloys are used in $\frac{1}{8}$ and $\frac{3}{32}$-inch diameters. This type of fluxing and brazing alloy combine to make neat joints which require practically no finishing.

Oxy-acetylene welding is used

(Continued on Page 114)

world's largest automatic welder . . .



SLASHES JOB TIME 94 PERCENT

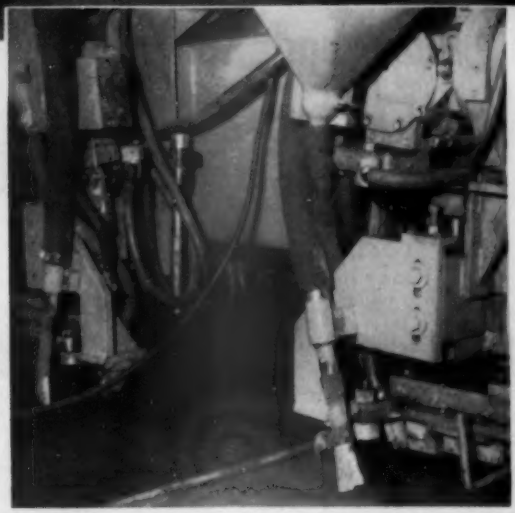
THE world's largest continuous welder now at work for The Morgan Engineering Company, reduces costs and the time of welding girder seams as much as 94 per cent.

The welder with a track length of 110′ can obtain speeds of up to 120″ per minute. The unit has two welding heads that float both vertically and along the ram horizontally. The welding heads will trace curves and follow a change in direction around a girder flange, allowing two seams of a girder to be welded at one time. The welder can also accomplish the welding of both girth seams of hoisting drums at one time. It is used with a constant potential motor generator type welder.

Developed by Morton Mfg. Co. and Morgan, the machine has eliminated many of the variables formerly encountered in manual arc welding of huge girders. Production of these heavy beams is an everyday job at Morgan, one of the country's largest manufacturers of cranes and heavy equipment.

In fabrication of a typical girder, no special edge preparation is used prior to welding, except for re-

Central instrument station gives operator fingertip control over two floating heads that weld simultaneously. Machine uses constant potential power source and motor generator.



Twin wire feed nozzles, automatic flux systems and contour tracers can operate at speed of 120 inches per minute.

moval of excess scale or rust. Fit-up is normally held to a maximum of $\frac{1}{16}$-inch gap. A 2-inch tack is made every 8-inches. Although the machine offers a speed range of from 0 to 120-inches per minute, for girders, the average setting is 25-inches to 30-inches per minute with $\frac{5}{32}$-inch wire. Controls are set for 500 to 550 amps, 32 to 36 volts.

Normally, two or three passes are made. Total time for the job is two hours. This compares with 60 hours consumed in manual arc welding.

Installation of the new equipment is part of the company's general emphasis on heavy industry "automation." Facilities include automatic welders, positioners that will accommodate weldments weighing up to 20-tons, and flame cutting machines which can shape-cut sizes ranging to 23-feet length by 11½-inches in width by 48-inches in thickness.

DR. AUGUSTUS B. KINZEL

Kinzel Receives Morehead Medal at IAA Convention

HIGHLIGHT of the 55th annual convention of the International Acetylene Association at the Shamrock hotel, Houston, Texas, March 22-24, was the presentation of the James Turner Morehead Medal to Dr. Augustus B. Kinzel, director of research, Union Carbide and Carbon Corp. Dr. Kinzel received the medal for his scientific and technological contributions to acetylene utilization. The award is made annually to the person or persons having done the most to advance the industry or art of producing or utilizing calcium carbide or its derivatives.

W. A. Brown, director and past president of the IAA and president of Liquid Carbonic Corp., made the presentation.

About the Recipient

Dr. Kinzel joined Union Carbide as a research metallurgist in 1926. His research contributions have covered a wide range of activities in the fields of industrial gases, metallurgy and atomic energy. He pioneered in the theory of stainless steels, the development of weldable alloy structural steels and research and development of special alloying metals. Union Carbide's new process for titanium crystals is largely creditable to Dr. Kinzel, who has more than 40 United States patents issued to him.

Author of scores of technical and scientific articles, he has lectured to audiences in this country and most of Europe. An accomplished linguist, he usually lectures in the language of the host country.

During recent years, Dr. Kinzel has devoted much time to national defense. He is presently chairman

of the Naval Research Advisory Committee and chief consultant in metallurgy to Los Alamos Laboratories and other units of the Atomic Energy Commission.

Hear Business Predictions

At the convention's opening luncheon more than 450 delegates heard John J. Forrest, business and financial editor of the New York Times, predict that the nation's business would hit a soft spot before the end of 1955. Mr. Forrest based his forecast on what he called over-production of new automobiles and the construction of too many new homes this year.

"We should all know by July or August whether 1955 will be the year of the biggest boom," Forrest said. So far, in the first quarter of 1955, the American economy is said to be in the midst of a roaring boom —one, which if maintained, will shatter all records and make this the most prosperous year on record.

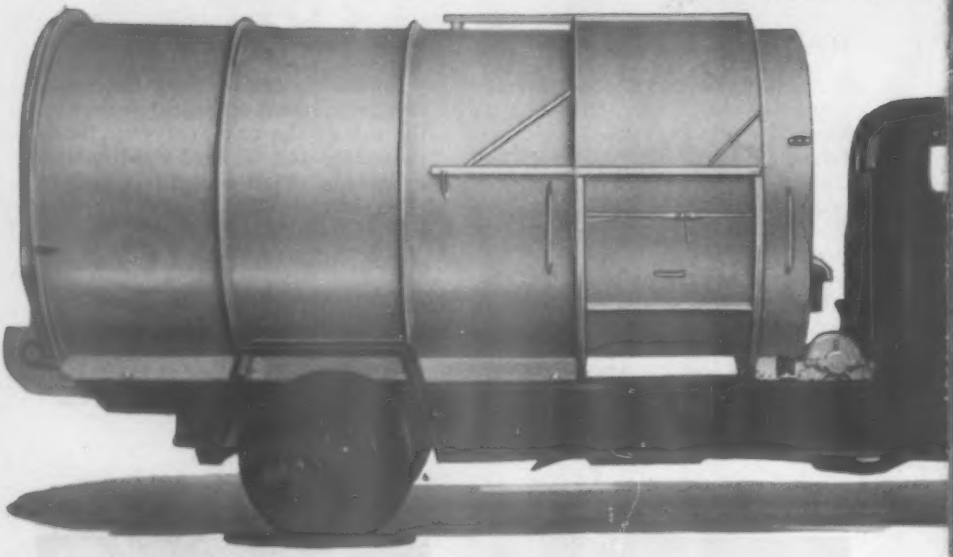
Numerous Technical Sessions

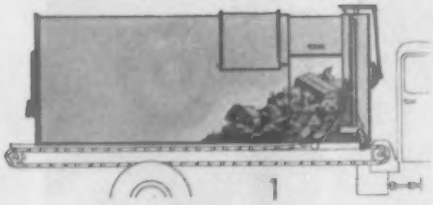
Following the opening luncheon, delegates heard technical papers on the use of the oxy-acetylene flame in marine and oil field welding and in steel production and fabrication. Efficient and safe use of the process was also discussed.

Members concluded convention activities with a business meeting. E. A. Daniels, president of the IAA for 1954-1955 and vice president of Victor Equipment Co., presided. Mr. Daniels is succeeded by J. Carl Bode, president of National Carbide Co.

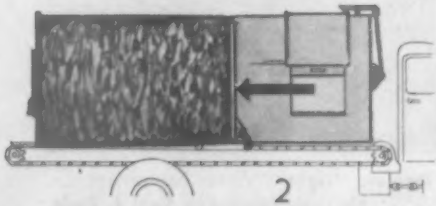
1955 convention was swan song for **E. A. Daniels,** (right), Victor Equipment Co. vice president, who headed IAA for 1954-1955. He is succeeded by **Carl J. Bode,** president of National Carbide Co. (left).

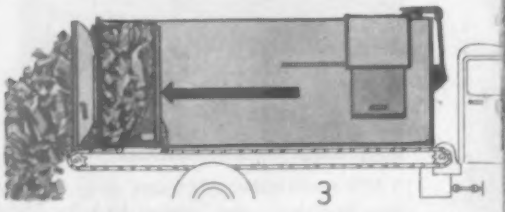
Welds withstand 50,000





Here's the Pak-Mor refuse collection unit . . . welded throughout with A. O. Smith SW-85 electrodes. Front panel opens for loading. Packer plate not only compresses the load but also serves to discharge the *complete load* through the rear hatch.





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lbs. force . . . . all day, every day. . . . without failure

They're made with A. O. Smith SW-85 electrodes . . . serve on ingenious Pak-Mor refuse collection units

A. O. Smith SW-85 electrodes are used *exclusively* in the building of unique all-welded Pak-Mor refuse collection units. Welds must *continuously* withstand a force of 50,000 lbs. exerted by a heavy-duty packer plate.

Pak-Mor selected SW-85 electrodes because of high tensile strength and durability. They are also pleased with easy handling in all positions — vertical, horizontal or flat. The SW-85 scores high with welders . . . is versatile in clean-up as well as production . . . readily adaptable to both a-c and d-c welding.

Get details from your A. O. Smith distributor or write direct. A. O. Smith Corp., Welding Products Division, Milwaukee 1, Wisconsin.

The man from A. O. Smith

Grant Annable introduced Pak-Mor management to the SW-85 electrode. Like all A. O. Smith welding salesmen, Grant is always ready *and able* to help solve welding problems.

Everything for welding is yours from A. O. Smith!

Welding is now *(and always has been)* our full-time business. We offer you America's top line of electrodes . . . welder-proved equipment and accessories . . . everything from a-c and d-c welding machines to helmets and tools.

Through research . . . a better way

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PANDJIRIS POSITIONERS

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Capacities up to 140,000 lbs.

See you at Booth 245 Kansas City Welding Show June 8-10

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... POWER to turn cylinders continuously for circumferential seams ... to position them for horizontal welds. No crane or manual work! Pandjiris builds 'em right ...

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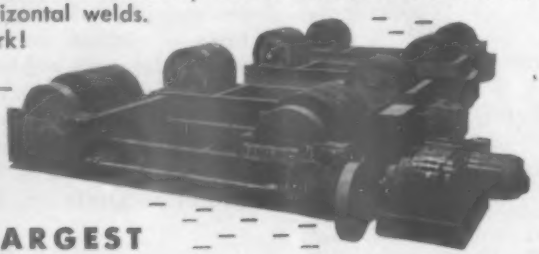

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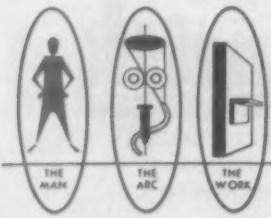

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efficient positioning of all three

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Light and tough, with good heat and corrosion-resistant properties, titanium has captured the public imagination. Written by one of the top research men in the country, here is the first half of a two part article on fusion welding titanium.

ARE YOU READY TO WELD TITANIUM?

by ORVILLE T. BARNETT
Supervisor of Welding Research
Armour Research Foundation
Illinois Institute of Technology

TWELVE pounds of useless dead weight are removed from a weary soldier's back when welded titanium pressure tanks replace steel in certain combat equipment. At speeds approaching 1400 miles per hour, aerodynamic skin friction heats the metal surfaces of supersonic aircraft to 300° F and more, making titanium a necessity. Add excellent corrosion resistance to sea water and air with good weldability in many commercial grades and the scramble for superlatives for this new light metal becomes understandable.

Some of the first welding of titanium was done at Watertown Arsenal under the direction of Colonel B. S. Mesick. Inert-gas arc welding of titanium was developed for a lightweight base-plate assembly of the 81 mm mortar. The preceding two-piece design of another metal required two men to transport it. When the new one piece titanium base plate was fabricated one man could handle it easily.

Logically, the ceaseless search for weight saving in aircraft has turned to titanium. As jets flash through the skies with speeds measured in mach numbers, which are multiples of the speed of sound instead of miles per hour, aircraft wings are becoming thinner while loads are growing heavier. If only gage for gage replacement of stainless steel by titanium is achieved, a 40 percent weight reduction results. Possible substitution of titanium alloys for stainless steel in and around a large engine may save over a half ton.

Commercially pure titanium, the most readily weldable type, has been applied mainly in airframes for non-structural parts for corrosion and heat protection. High strength titanium alloys, of which the manganese titanium alloy is a weldable type, have been used for structural parts such as frames, bulkheads, longerons, stressed skins and similar highly stressed members. In jet engines titanium serves in compressor housing and discs, rotating and stationary compressor blades, spacer rings, through bolts and many other forged and machined parts.

Since the air we breathe is poisonous to titanium during welding

heat cycles, the number of useful and practical welding processes is necessarily limited. Both inert-gas metal-arc welding and resistance welding produce excellent weldments. Either the tungsten inert-gas or the metal inert-gas process may be selected with equally good results. The latter method which uses a consumable electrode avoids weld metal contamination with tungsten. Spot welding and flash butt welding have proven to be readily adapted for titanium joining. Other fusion welding processes such as the oxy-acetylene, metal-arc welding with coated electrodes or atomic hydrogen welding are impractical at this time.

Atmospheric Contamination

Above 1400° F oxygen, nitrogen, hydrogen and water vapor are absorbed from the surrounding air by titanium metals. On cooling the metal becomes brittle displaying no, or only very limited, ductility. Nor will heat treating or other post-welding practices repair the damage caused by atmospheric contamination.

Develop Joining Techniquess

Suitable welding, brazing and soldering techniques for joining titanium parts have been worked out. When temperatures of 1400° F or more are necessary, either argon or helium protective atmospheres should be established. Unlike the inert-gas arc welding of aluminum, for example, extra precautions must be taken. In aluminum no irreparable damage occurs when the hot underside of a weld is exposed to the air. With titanium, however, both surfaces, top and bottom, of the metal must be protected.

Good commercial arc welding practice develops jigs and fixtures that not only support the parts in welding alignment but also hold a flowing stream of helium against the critically heated areas. Further protection is afforded the rapidly moving arc by a trailing shield, which is designed to continue the

WHEN TITANIUM BURNS

Titanium is explosive. It may ignite spontaneously when dispersed as a fine powder in air. Hazards, according to the U.S. Bureau of Mines, may exceed those accompanying finely divided magnesium, or flaked aluminum powders. Even fine chips and turnings can be ignited with a match. They burn with a brilliant incandescence. Larger chips—$\frac{1}{32}$" by $\frac{3}{16}$" and up—do not ignite easily, present only a slight fire hazard.

Water won't put out a titanium fire. It accelerates the burning rate, may cause hydrogen explosions. Carbon tetrachloride and dry chemical extinguishers seem unsuitable. Carbon dioxide doesn't inhibit titanium flames. Dust clouds of titanium will burn readily in a pure CO_2 atmosphere. Argon and helium are ineffective unless they displace virtually all air, as in a chamber.

Don't let a titanium fire start.

When machining titanium, heat conductivity of the metal is such that, if heavy tool cuts are taken, both work and tool become very hot and may ignite oil-type cutting lubricants. Drilling and tapping may cause overheating.

Water or water base coolants should be used for all machining operations with titanium. Carbon dioxide may be used.

Remove cuttings and chips frequently

inert-gas shielding until the titanium weld metal and heat affected zone have cooled below the rapid gas absorption temperature. An experimental welding fixture with holes provided in the copper back-up plates allows helium shielding of the underside of the weld. Resistance welding generally results in such short time exposures at critical temperatures that inert-gas protection is not necessary. Under some conditions inert-gas atmospheres have improved joint properties slightly.

Choice of Argon or Helium

Either argon or helium are recommended protective atmospheres either singly or in combination. Argon is reported to provide a more stable arc while helium may permit welding speeds of two or more times those possible with argon. Helium is less expensive than argon. Argon, being almost ten times heavier than helium and thus better able to blanket the molten titanium weld pool, is often used for the weld side while helium provides the back-up protection. Since commercial helium may contain objectionable amounts of moisture, it may be advisable to dry the gas before introducing it to the welding area.

Sometimes, particularly when small sub-assemblies are being welded, it is difficult to establish inert atmosphere protection. These small weldments may be welded in a chamber filled with inert-gas and provided with a filter glass viewing window and gas tight ports through which the operator's arms gain access to the work.

Weld appearance provides experienced operators with clues to atmospheric contamination. Water vapor leads to a rough bluish weld bead and colors the parent metal as well. Nitrogen brings about a dull varicolored blue and golden surface. Oxygen yields a gray weld and hydrogen brings about a tarnished weld. Thus the specific

and place in covered metal containers. When containers are half-full, remove to isolated outdoor location.

Cutting tools should be designed for titanium and kept sharp to minimize heat.

Good housekeeping must be observed. Stocking processes should be kept at absolute working minimum.

When grinding or sawing titanium, dangerous dust and particles are produced. In dry grinding, particles seem to oxidize and become inert. Dry grinding should be done with frequent breaks to allow heat in material to disperse. Grinders should be equipped with a water exhaust. Such a system should not be used for other metals.

In wet grinding, only water or water base coolants should be used. Titanium sludge from wet grinding or machining should not be allowed to dry before removing to isolated outdoor locations.

Some fires may be extinguished with approved dry compound extinguishing powder or absolutely dry sand in the manner of magnesium fires.

Handle titanium with care!

by THOMAS BROWN, Safety Director
American Welding & Mfg. Company

TABLE I. WELDABLE COMMERCIAL TITANIUM AND TITANIUM ALLOY SHEET AND PLATE

PRODUCER	GRADE	STRUCTURE	WELDABILITY
Rem-Cru Titanium, Inc.	A-55	α	Excellent
	A-70	α	Excellent
	C-110M (8% Mn)	α + β	Good—Heat treat after welding
	A-110 AT (5% Al—2.5% Sn)	α	Excellent
Titanium Metals Corp. of Amer.	Ti-75A	α	Excellent
	Ti-100A	α	Excellent
Mallory-Sharon Titanium Corp.	MST Grade III	α	Excellent
Republic Steel Corporation	RS-55	α	Excellent
	RS-70	α	Excellent
	RS-70A (1.25% Mn)	α + β	Excellent
	RS-110A (7% Mn)	α + β	Good—Heat treat after welding
	RS-110BX (3% Mn, 1.5% Al)	α + β	Good—Heat treat after welding

contaminants introduced by a wet gas or a leak in the air tight system may be identified. Properly made inert-gas arc welds have a clear, silvery appearance of the titanium bead.

Table I lists the present commercial grades of titanium and titanium alloys that are available in sheet and plate form and that are weldable. In general, commercially pure titanium (materials listed in Table I without any qualifying analyses) and the stronger, all *alpha* titanium alloys produce welds with about the same strength and ductility as the base metal. The coarse grained weld metal in the heat affected zone apparently does no harm.

Mixed *alpha* + *beta* alloys are also weldable. If *beta* stabilizing constituents are below 3%, the alloys should produce ductile welds. Alloys like C-110 M and RS-110 A yield welds that are brittle because of retained *beta* structure. Suitable

(Turn to Page 69)

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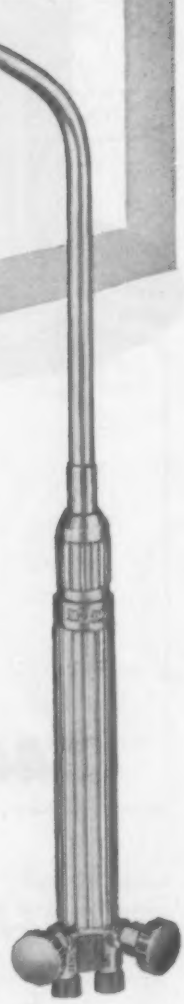

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GET IT FROM YOUR **LINDE** JOBBER

The terms "Purox" and "Linde" are registered trade-marks of Union Carbide and Carbon Corporation.

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TABLE II. MECHANICAL PROPERTIES OF C-110 M TITANIUM AS RECEIVED AND AS WELDED(1/16 IN. SHEET—6.8% Mn)

	AS RECEIVED	AS WELDED
Ultimate Tensile Strength, psi	130,000	65,000
Elongation, % in 2 in.	17	1
Free bend, angle in °	180	13
Hardness (sheet or weld), VHN	283	401

TABLE III. MECHANICAL PROPERTIES OF C-110 M TITANIUM AS WELDED AND POSTWELD HEAT TREATED (1/16 IN. SHEET—6.8% Mn)

	AS WELDED	POSTWELD HEAT TREATED
Ultimate Tensile Strength, psi	65,500	143,000
Elongation, % in 2 in.	1	4
Free bend, angle in °	13	180
Hardness (weld) VHN	401	311

heat treatments restore ductility.

Since C-110 M (formerly RC-130 A) is commercially available and since it is somewhat typical of a mixed *alpha + beta* alloy that is weldable if proper post-welding heat treatment is performed, a detailed study of this alloy should be helpful. The following discussion is based on original research work done by the Welding Section of Armour Research Foundation. In Table II mechanical properties of this 8% manganese titanium alloy show that welding cuts the tensile strength down to almost half the unwelded value, destroys over ninety per cent of the tensile elongation, ruins the free bend ductility and increases weld metal hardness over the alloy sheet.

> *EDITOR'S NOTE: Titanium and titanium alloys may be in one or both of two crystal forms called alpha and beta. Alloying additions and heat treatments determine which of these two predominate. Crystalline structure is important because it influences the mechanical properties of titanium materials.*

When compositions of alloys vary considerably, as they may in the present stage of titanium production, heat treatments should be adjusted to the particular composition being welded. Producers are making such rapid strides in uniformly

(Continued on Page 118)

Increase hardfacing production

Constant arc length regardless of operator movement or surface roughness.

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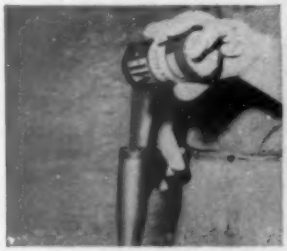
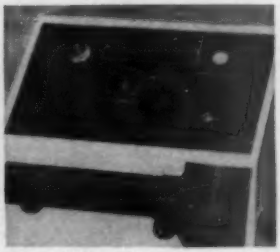
See a demonstration of the Amsco MF —its speed, quality of weld and uniform deposit. See how easy it is to operate. Try it and you'll think of many more reasons why it will save hardfacing time and labor costs. Your Amsco Distributor is ready to show it to you now.



Flux held in cone contains the welding alloy you require.



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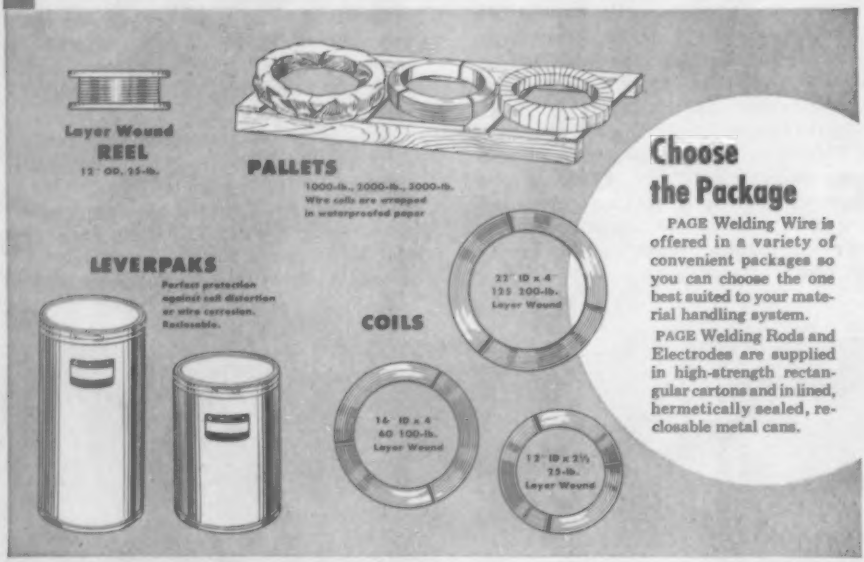

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for Better Value

Circle No. 41 on Reader Service Card.

By R. C. KOPITUK
and C. V. FOERSTER

VERSATILE NEW HIGH-NICKEL ALLOYS EXPAND BRAZING APPLICATIONS

Durability, good mechanical properties and resistance to corrosion and oxidation — these are characteristics of a new series of brazing alloys. These nickel-base materials can be used with any brazing process regardless of heat source. Here is the second and concluding part of a fact-filled article.

The new alloys, either in rods or any form of powder, can be used with virtually every type of brazing process, regardless of the source of heat energy, as follows: oxy-acetylene flame, furnace, induction, or salt bath.

Where heavy coatings or comparatively large quantities of the alloy are required, the alloys, in rod form, can be applied very successfully with an oxy-acetylene torch. A neutral or slightly reducing flame is required. Otherwise, conventional procedures for torch brazing should be followed.

Various Forms Available

In powder form, these new alloys can be applied very efficiently with any of the proprietary torches which deliver the powder through an oxy-acetylene flame. Such torches are particularly efficient where close control of heat and thickness of deposit are necessary, and in places that are inaccessible for manual application with torch and rod.

Satisfactory coating or positioning can be done with the alloy in rod form and any type of hand welding gun using a non-consuming electrode and an inert atmosphere shield.

Any standard furnace equipment which can produce operating temperatures up to 2150°F will braze the alloy satisfactorily. While brazing is generally accomplished at lower temperatures, additional heat may be required under certain conditions.

Induction heating requires maximum contact between parent

metals and brazing alloy to assure proper heat transfer. This can be secured through proper joint design and position of the assembly during brazing.

Preliminary research has shown that salt baths may be employed successfully, but little information is yet available on this technique.

Joint Strength

The strength of brazed joints made with any type of metal is affected by several factors:

A. Design of the assembly
B. Clearance in the joint
C. Flow and wetting characteristics of the brazing alloy
D. Soundness of the brazed joint
E. Composition of the brazing alloy

Joints made with these new alloys are also affected by the following factors:

F. The amount or depth of alloying
G. Corrosion and oxidation resistance of the brazing alloy

Joint Clearance

With all brazing alloys, joint clearance should be held to the minimum that will permit free flow of the alloy. The more fluid of the new alloys, such as B and C, when used on thin sections with rapid heating, develop flow characteristics equivalent to copper. They can be used successfully on press fits and clearances less than .001".

Joint strength will drop as joint clearance increases.

Flow and Wetting Characteristics

The flow and wetting characteristics of any brazing alloy determine percentage of joint area filled by the alloy. Maximum strength is possible only when a complete joint is secured. Voids or areas incompletely joined will always reduce ultimate strength of the joint.

In the case of brazing alloys used in powder form, the best flow is secured when particle size of the powder is the coarsest compatible with design of the joint. Coarser grains offer less surface exposure for a given volume of alloy, hence better flowability.

Flow characteristics are affected significantly by the self-fluxing qualities of these alloys. Boron and silicon react with oxidizing gases even at low partial pressures. However, presence of chromium in alloys C and D retards the rate of oxidation. These characteristics should be considered in selecting brazing alloys for use in oxidizing atmospheres.

Exothermic gas is slightly oxidizing to chromium steels. Therefore, the chromium-free alloys, which are actively self-fluxing, will produce best results when brazing stainless or heat resistant alloys in this atmosphere. For carbon and low alloy steels, the exothermic atmosphere has an opposite effect, and the "C" alloy, containing 7.0% chromium, will braze well.

Soundness of the Joint

Maximum joint strength is secured only with joints which are 100% sound. Such defects as flux inclusions, voids, cracks and insufficient alloying will reduce strength of the brazed joint. Selection of the proper alloy, proper joint clearance, placement of the brazing alloy, use of a non-oxidizing atmosphere or a maximum of 15% of flux, and the selection of a proper time-temperature cycle, all contribute to producing sound joints.

Cracks can be caused by move-

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* Actual photo of refrigerator plant production line where 11 joints are brazed on one assembly with less than 1% rejected under Underwriter's pressure test of 1500 lbs. per sq. in.

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ment of the pieces while the braze metal is still semi-fluid. Proper support of the pieces being joined will help to alleviate this. Use of the lower side of the brazing temperature range is essential, to permit the braze area to solidify before contraction begins. If a maximum time-temperature cycle can be used without movement of the pieces, sound, fully alloyed joints can be secured.

Composition of the Brazing Alloy

The chromium- containing brazing alloys may form refractory flux inclusions, except when used under perfectly clean, non-oxidizing conditions. In general, they will produce lower physical properties except under the conditions previously discussed.

Joints made with No. 347 stainless are not materially reduced in strength when the brazing alloy contains 7% chromium or less (as in the C alloy), but drop off more sharply as chromium content increases beyond that figure.

High chromium content in the brazing alloy can also contribute to formation of voids in the brazed joint, even when all other approved practices are observed. Inspection figures show consistently better joints made with chromium-free alloys, and only slightly lower results with the use of C.

Design of the Assembly

The usual good design practices which have proven successful with other brazing alloys also apply to these new high nickel alloys. Design should permit even distribution of heat through the joint; should tend to stress the joint in

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shear or compression; should provide maximum joint areas; should permit flow of the brazing alloy in one direction through the joint by capillarity and gravity and should provide sufficient venting to avoid gas entrapment in any part of the joint.

Amount of Alloying

The alloying process favorably affects joint strength in two ways:

1. As alloying progresses, melting point of the joint metal increases progressively and the fluid or semi-fluid braze metal is replaced by a new, solid alloy.
2. This newly-made alloy is always more ductile than the original brazing metal, and will distribute stresses much more readily.

Oxidation and Corrosion Resistance

Joints made in high temperature alloys can be unfavorably affected by oxidation unless the proper brazing alloy is selected. The oxidation resistance of all these new nickel brazing alloys is high. Results secured with C and D are slightly better than the others, due to their chromium content.

Most low temperature brazing alloys fail when exposed to strong acids. Other corrosive media may cause failure due to galvanize cells created by wide EMF differences existing with dissimilar alloys such as silver or copper vs. stainless steels.

These new nickel alloys are inherently resistant to many types of corrosion, and because of their alloying action, in brazed joints tend to develop corrosion resistance comparable to that of the parent metal. Powders covered in

For more information concerning these new brazing alloys, write Editor, Industry & Welding Magazine, 1240 Ontario St., Cleveland 13, Ohio, or Circle No. 155 on Reader Service Card.

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Growing industrial importance of the West was dramatically highlighted at the Ninth Western Metal Exposition held March 28-April 1 in Los Angeles. Over 53,000 interested observers filled huge Pan-Pacific Auditorium and packed technical sessions to capacity.

1. Tom Lonergan, Sciaky Bros. Co. ad manager with prettiest part of Sciaky exhibit. 2. At left, Myron Stepath, head of Arcair Company. 3. Hobart Bros. Company features welders, electrodes. 4. Crucible Steel Co. was also represented.

Up and down

5. Harnischfeger Corp. announced exclusive distributorship for Absco Welding Supplies which will carry P&H line in Los Angeles area. 6. F. L. Blodgett, general sales manager, Alloy Rods Co., tell "Atom-Arc" story. 7. Interested observers watch "Aircomatic" demonstration. 8. Clamps and more clamps are shown by Bill Roberts, Detroit Stamping Co. vice president.

at the Western

9. A. O. Smith's George E. Kemper, general manager, Welding Products Division (right) and Western District Sales Manager, Al Schneller, (extreme left) visit with friends. 10. John Mattingly, president of Heath Engineering Co. (right) visits with Clarence Tishman of Gordon Duff Co. 11. Balteau X-ray unit aroused interest. 12. New rectifier-type arc welder is introduced by Vickers Electric Division, Vickers, Inc.

the aisles

Metal Show

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A: One big factor is the quality of the electrode used.

Q: How can you be sure of getting the best electrode?

A: By insisting on Alcoa's new I.G.* Electrode.

Q: Why?

A: Every production lot of Alcoa® I.G. Electrode is test welded and the welds X-rayed for soundness. Each 10-lb spool is individually packed to maintain the super-smooth finish to assure soundness of weld and smoothness of feed. Each of five alloys, 1100, 4043, 5154, 5254 and 5356 (formerly 2S, 43S, A54S, B54S and XC56S), is available in six diameters. There is no better electrode.

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ALUMINUM COMPANY OF AMERICA

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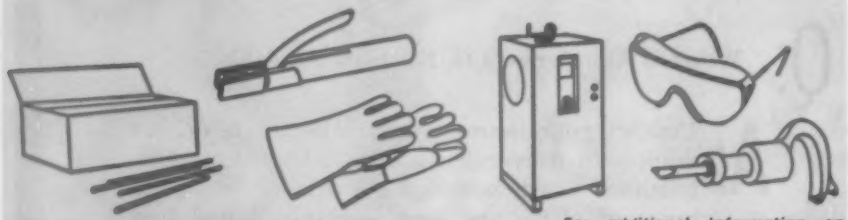

new products

For additional information on the products appearing on this and the following pages, mark the key number of the item on the card bound into this issue. Drop the card in the mail—no postage is required.

Atomic Hydrogen Torch

A new lightweight atomic hydrogen torch now on the market is said to solve many problems formerly experienced with this type of equipment. All parts

are readily replaceable. Although, easily assembled, the unit is rigid and sturdy, according to the manufacturer. Adjustments while in use are simple to make. Once made, tubing will retain correct position for a long time without further adjustment, according to Acme Welding Supply, Inc., marketers of the new unit.

Circle No. 140 on Reader Service Card.

Flame Cutting Equipment

The Flame Cutting Equipment Co. has introduced a complete new line of cutting tips, cutting accessories under the trade name of "Proxy".

Proxy torch tips have been designed especially for use with propane, butane, and natural gas. Smooth, clean cuts with sharp top and bottom edges, and cut surfaces having low brinell readings are said to be obtained.

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Close Tolerance Alloy Welding Wire

A line of automatic welding wire with size tolerances held to 1/1000 inch is announced by Mir-O-Col Alloy Co. According to the manufacturer, the alloy wire can be operated on AC or DC current with submerged arc as well as other automatic welding methods.

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Welding Head Manipulator

A semi-automatic, demountable welding head positioner built by Pandjiris Weldment Co., is claimed to be fully portable. Unit has three jacks for raising clear of floor and leveling. Boom

and controls are mounted on one column. Micrometer screw adjustment is said to permit raising and lowering head by hand. Entire unit is extremely vibration-free, according to the manufacturer.

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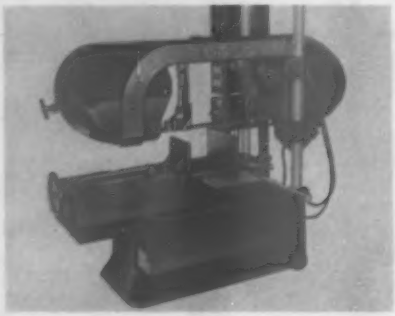
Heavy Duty Band Saw

Hydraulically operated band saw with controls conveniently placed is said to provide greater safety, uniform blade



feeding pressures and an automatic cutting cycle. Produced by Wells Mfg. Co., other features are said to include special chip flushing unit, adjustable blade guides, and foolproof blade tensioning set up.

Circle No. 144 on Reader Service Card.

Safety Shoe

A safety shoe for welding operators who work in extremes of cold or heat has been developed by Lehigh Safety Shoe Co. Entire upper of each shoe is said to be padded with a thin layer of foamed vinyl for insulation. Same construction available in 8" field boot and 12" rubber winter-pac. All models offer regular steel toe protection.

Circle No. 145 on Reader Service Card.

VISIT INDUSTRY & WELDING AT BOOTH 144

WELDING SHOW

MUNICIPAL AUDITORIUM

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Cut welding losses due to moist rods

Your cheapest insurance against wasteful defective welds is DryRod. This oven protects low-hydrogen, austinetic, and other special alloy electrodes, as well as the new iron powder contact rods, against moisture.

DryRod contributes to steady welding, less slowdown, less re-work, less scrap. It can pay for itself out of rod salvage alone. Operating cost is less than 15c per 24 hours.

DryRod is completely wired, ready for use. Automatically controlled temperatures adjust from 175° to 550° F. for storage or re-baking.

Three sizes available . . . 10-lb.-capacity portable . . . standard 350 lb. (shown here)...large 900 lb. Type 300 and 900 quickly convert for pre-heating, drying, tempering, drawing of small die parts, and other industrial uses.

DryRod—Trademark X-DR-16

For details, see your welding supply dealer or write . . .

DryRod DIVISION OF Phoenix Products Co.
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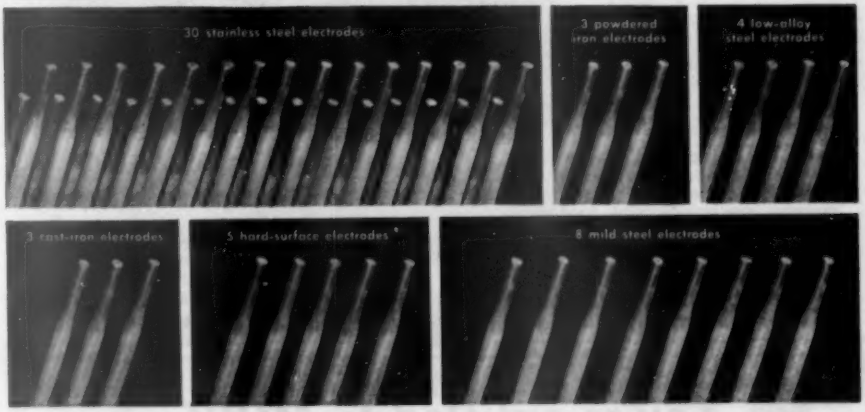
Take two minutes to read this:

Try Westinghouse Electrodes of your choice at our expense. No obligation

The Westinghouse line consists of:



Pick any electrode from the full Westinghouse line illustrated above. Call your local Westinghouse welding distributor. Ask for free sample packs of electrode best suited to your welding job. If you're not sure which you need, he'll be glad to suggest proper types. He'll send them out the same day. You're under no obligation. Samples are sent absolutely free!

WHY WE MAKE THIS OFFER—Words can't sell electrodes. On-the-job performance can. On your job. Under your conditions. We want you to prove to yourself—on these terms—Westinghouse electrode superiority.

YOU CAN'T LOSE—You've everything to gain. Call your Westinghouse welding distributor today. Don't put it off. Act now.

SEE DEMONSTRATIONS

of Westinghouse electrodes, machines and WEST-ING-ARC MIG welding process

AT WELDING SHOW BOOTH 270

Municipal Auditorium, Kansas City, Mo.
June 8 • 9 • 10

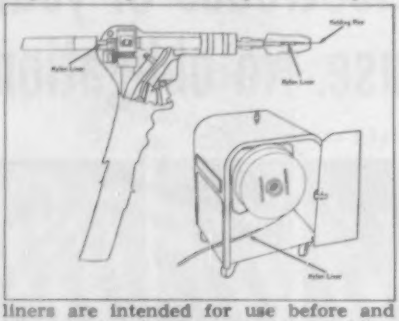
YOU CAN BE SURE...IF IT'S Westinghouse

J-21868-A

Circle No. 42 on Reader Service Card.

Nylon Tubing Liners

Introduction of nylon tubing for use with welding equipment is announced by Polymer Corp. of Pennsylvania. Nylon



liners are intended for use before and after feed rolls in automatic welding guns. The material is said to offer good abrasion resistance and moderate flexibility.

Circle No. 147 on Reader Service Card.

Butt Welder

A butt welder for a variety of sheet metal applications has been developed by Solar Aircraft Co. Said to be capable of being used in inert arc operation, the machine comes in two models. One welds seams up to 30" long. The other has a capacity of 60".

Circle No. 148 on Reader Service Card.

Trigger-Type Clamps

A new line of toggle clamps which incorporates a trigger release mechanism is said to provide instant one hand re-

lease. According to the manufacturer, Detroit Stamping Co., the clamps offer greater holding pressures and durability.

Circle No. 74 on Reader Service Card.

You're entitled to MORE . . .
and you get it!

with **HI-AMP**

ELECTRODE HOLDERS

HERE'S WHY . . .

- Completely enclosed Insulated Spring—can't be knocked or shorted out.
- Handle withstands higher temperatures.
- Low Trigger cuts Operator fatigue.
- Reversible Tip Insulators—long service.
- Spring Screw for quick replacement and adjustment of Rod . . . Slender Tongs for tight places.

Write TODAY for complete story of the All New HI-AMP Electrode Holder and Ground Clamp.

SOLD ONLY THROUGH WELDING SUPPLY DISTRIBUTORS THROUGHOUT THE U.S. AND CANADA.

WAGNER MANUFACTURING CO.

250 W. 1st SOUTH ST. JACKSON, MISSOURI

Weld with Wagner

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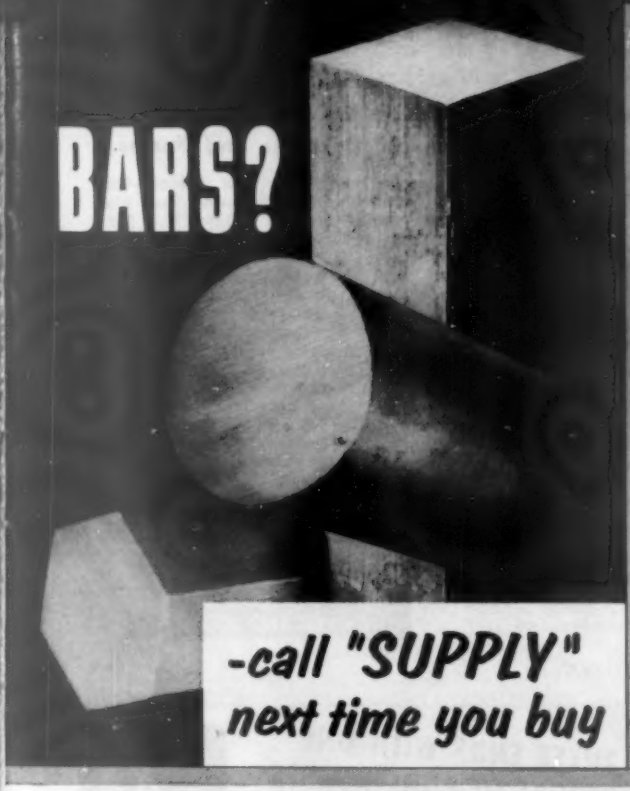
Circle No. 49 on Reader Service Card. →



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Cold Finished—Hot Rolled—Alloy—Stainless—Aluminum—we stock them *all!* Just call us next time you need bars—any kind, any quantity. From our huge stocks we can give you speedy delivery of exactly the type, grade, size, condition and finish you want. We can give you any technical assistance you may require.

Cold Finished Bars. Largest variety of sizes, grades, finishes in rounds, hexagons, squares, flats. Including USS "MX" high-speed, low cost screw stock.

Hot Rolled Bars. Regular Merchant Bar Quality and Special Bar Quality. Rounds, hexagons, squares, flats, half rounds, ovals, half ovals, Bar Shapes.

Alloy Bars. Hot rolled, cold finished, Aircraft Quality. Sold with USS guarantee of minimum hardenability. Each shipment includes specific working data.

Stainless Bars. Widest range of sizes from stock or mill. Rounds, hexagons, squares, flats, angles, channels, special sections.

Aluminum Bars. High quality rounds, hexagons, bar shapes—full range of sizes.

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FREE... OUR LATEST STOCK LIST

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Chicago 4, Illinois

Please send me—without charge or obligation—your latest Stock List.

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Company.....

Address.....

City.....State.....

UNITED STATES STEEL

Low Hydrogen Electrodes

Four different low hydrogen electrodes are now being marketed by Metal & Thermit Corp. Called, Croloy, the electrodes are said to deposit weld metal with unusual stress-rupture characteristics over a wide range of temperatures, along with good ductility, and resistance to corrosion and oxidation. Intended for welding chromium-moly steels, applications include welding of power piping and pressure vessels.

Circle No. 56 on Reader Service Card.

Air Inflated Grinder Drum

A drum used with abrasive belts that slip over it for weld finishing operations is introduced by Nu-Matic Grinders, Inc. Units are said to offer exact concentricity to prevent wobble and chatter.

Circle No. 18 on Reader Service Card.

Electrode for Monel-Type Wrought Castings and Forms

A new electrode for Monel-type wrought castings, forms and other high nickel copper content alloys has been introduced by Eutectic Welding Alloys Corp. Called EutecTrode 2000DC, it operates at as low as 40 amps, has a special casting which permits short "near contact" arc, reducing heat input.

The new electrode provides practically pure monel deposits completely without spatter and having tensile strength over 70,000 psi. EutecTrode 2000DC is said to be ideal for joining dissimilar metals such as Monel and mild steel. It has wide usage as a corrosion-resistant cladding for mild steel, for fabrication of monel sheets, plates and pipe. It is available in 1/8 and 5/32-inch sizes.

Circle No. 150 on Reader Service Card.

CIRCLE NUMBERS ON THE CARD AND MAIL!

NOTCH THESE ENDS WITH ONE STROKE OF PUNCH PRESS

ARC-FIT TWIN NOTCH

NO DEFORMATION Shears from inside out—cuts clean edges; eliminates need for further finishing; aligns notches automatically.

PERFECT "T" Joints for welding or brazing.

PRODUCTION NOTCHING Actual production time per pipe or tube end reduced to less than 3 seconds.

INTERCHANGEABLE Punches and dies up to 2½" O.D. pipe or tube for STANDARD TWIN NOTCH. (Special units available up to 3" O.D.)

PATENT PENDING

SEND FOR DESCRIPTIVE LITERATURE

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Fillmore 5-0160

Circle No. 50 on Reader Service Card.

ARCOS FOR FINEST QUALITY WELDS

NEW aluminum spooled wire offers these advantages for inert gas welding

From the standpoint of economy and speed, the welding of aluminum by inert gas produces good welds, providing the aluminum wire is properly prepared for this process. Arcos has established the controls necessary to assure the high quality required for good welds. That's why it will pay you to specify Arcos ALUMAR Spooled Wire. Its uniform, clean finish gives better conductivity and arc stability.

For every aluminum welding job, Arcos offers the wire you need for the results you want. Arcos Corporation, 1500 South 50th Street, Philadelphia 43, Pennsylvania.

WELD WITH ARCOS

ALUMINUM AND STAINLESS SPOOLED WIRE

Circle No. 51 on Reader Service Card.

Versatile Clear Plastic

Developed by Homalite Corp., CR-39, a new transparent plastic material for use in welding helmets and goggles is now available. According to the manufacturer, it is light, virtually unaffected by weld splatter, highly resistant to shatter and abrasion, and immune to chemical action. In addition, it is said to machine easily and have "light piping" and "edge-lighting" qualities suited for use in instrument panels and faces. The new material is recommended for grind-

Circle No. 151 on Reader Service Card.

Low Alloy Steel Electrode for Chrome-Moly Steels

A new line of low alloy steel arc welding electrodes for chrome-moly alloy steels has been introduced by Champion Rivet Co. Designated as Champion Croloy, these low carbon content electrodes are of the lime ferritic, AWSxx15 type and said to be excellent for all position welding, using DC, reverse polarity.

Available in 3/32-inch through 3/32-inch diameters in four grades, electrodes have several advantages according to the manufacturer. These include elimination of weld cracking, high preheats. Postheat after welding and prior to stress relieving is said to be unnecessary except with extremely heavy sections.

Circle No. 152 on Reader Service Card.

FOR VALUABLE FREE DATA SEE PAGE 30.

FOR QUALITY WELDMENTS USE

***Drawalloy* CORPORATION**

QUALITY CONTROLLED

STAINLESS STEEL

Welding Wire

- **available in Spools, Coils and Lengths**
- **for Automatic and Semi-Automatic gas and inert arc welding**

Welding wire by Drawalloy is made to an exacting high standard . . . a high standard established by long-experienced welding men who know welding wire and how it must work. Set-ups for automatic and semi-automatic welding take more time than regular welding. That's why you want to be sure of satisfaction *before* you start. This *reliable* wire is weld-tested to give the best results every time. Write today for complete information and prices.

VISIT OUR BOOTH 227 AT WELDING SHOW
Municipal Auditorium, Kansas City, June 8-10, 1955

Drawalloy
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ELECTRODES, HOLDERS, FORGINGS, CASTINGS, ALLOY ROD and BAR STOCK . . . . For Better Resistance Welding.

means . . .

WW SHIPS THE SAME DAY!

Service is what you can count on from WW. Many of the electrodes and holders listed in WW Catalog 14,650-4 are carried in stock. And, by means of a streamlined order-handling system, shipment is made from this stock on the same day the order is received. If there is not sufficient quantity on hand, part of your order is shipped immediately, the remainder later.

Along with this new, fast SSD service, you can continue to count on WW top quality in resistance welding materials.

WRITE, WIRE OR PHONE YOUR ORDER TODAY

W551 *WW Teletypewriter DE-1179* *Telephone TExas 4-8400*

WW **WW ALLOYS, INC.**
Division of Fansteel Metallurgical Corporation
11644 CLOVERDALE AVENUE • DETROIT 4, MICHIGAN
Home of Premium Quality Alloy Castings and Forgings

Circle No. 53 on Reader Service Card.

NEW Arc Welding System using Murex® CROLOY Electrodes

for Welding CHROME-MOLY STEEL used in HIGH TEMPERATURE — HIGH PRESSURE SERVICE

See M & T's full line of electrodes at the AWS Welding Show Kansas City, June 8-10, Booth 250

- **PRODUCES JOINTS AS DEPENDABLE AS THE METAL YOU WELD**
- **SIMPLIFIES THE WELDING OPERATION**
- **SAVES YOU TIME AND MONEY**

IT'S NEW

IT'S PROVEN

IT'S ECONOMICAL

IT'S DEPENDABLE

M & T now brings you a new arc welding system using Murex CROLOY electrodes for fabricating and repairing chrome-moly steel equipment used in high temperature—high pressure service.

For years one of the nation's foremost producers of power piping and high pressure boilers has been using CROLOY electrodes in production. Their experience has proven the excellent operating characteristics of the electrodes, the dependability of the welds under high temperatures and pressures, the economy of the welding system.

With the new system you can greatly simplify preheat and postheat operations . . . you can practically eliminate underbead cracking, forget about costly defective welds . . . you can dispense with stress relieving on many weldments . . . you can weld chrome-moly steels more economically.

Murex CROLOY is a chrome-moly weld metal of outstanding stress rupture characteristics and high ductilities over a wide range of temperatures. Further information is available on this new welding system and the unique electrodes that have made it possible. Just write, or have a Murex man call.

METAL & THERMIT CORPORATION

Welding Division

100 EAST 42nd Street • NEW YORK 17, NEW YORK

Circle No. 56 on Reader Service Card.

an Industry and Welding

COST CUTTING BRIEF:

POSITION THAT WELD!

Use of positioners for welding has done much to increase weld quality, reduce costs and promote safety and comfort of operators. Units position work for down hand or flat welding, allow use of larger electrodes, fewer passes and eliminate necessity for tying up expensive cranes with relatively simple positioning work.

For certain jobs, some fabricators even make their own positioners. The welding stand shown here was made by a Canadian firm mainly out of shop leftovers. Store-bought parts such as special vises and magnetic clamps were secured from a welding supply distributor. Note shelves in the base of the stand, used for electrode storage.

This welding short cut earned some folding money for the Maintenance Supervisor who sent it in. Your cost cutting briefs can earn you ten dollars if accepted by the Here's How Editor, INDUSTRY & WELDING Magazine, 1240 Ontario St., Cleveland 13, Ohio. Just for submitting an entry, we'll send you a free copy of the new "Pocket Manual of Arc Welding" written by Editor Lew Gilbert.

Quality . . .
Performance . . .
Durability . . .

Victor presents . . . 8 completely new cutting torches

Models ST-1000, ST-1100, ST-1200 and ST-1300 Hand Cutting Torches . . . Model CA-1050 Hand Cutting Attachment . . . and Models MT-200 and MT-300 Machine Cutting Torches.

These completely new designs feature modern-clean-streamlined-sturdy lines . . . stainless steel preheat gas mixing chambers . . . heads of forged Everdur bronze or Monel . . . valve bodies and "Y's" solid die forged brass . . . hand-fitting oval shaped fluted brass handles . . . choice of cutting oxygen lever in four locations, top and bottom, front and back.

VICTOR Quality Cutting Torches will do a better job and stay on it under all kinds of difficult cutting operations.

VICTOR for welding

VICTOR EQUIPMENT COMPANY

Mfrs. of welding & cutting equipment; hardfacing rods, blasting nozzles; cobalt & tungsten castings.

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Circle No. 54 on Reader Service Card.

Near-record attendance of close to 400 delegates, who attended 1954 N.W.S.A. convention in San Francisco, are shown here listening to speaker. Interest on part of delegates is typical of that displayed at all Association functions.

Record Attendance Anticipated at Eleventh Annual N.W.S.A. Convention

PLANS for the Eleventh Annual National Welding Supply Association Convention to be held May 18-20 at the Edgewater Beach Hotel, Chicago, have left the "draftsman's board" and are now a reality, according to Robert C. Fernley, Association secretary-treasurer.

The Convention promises to be one of the most successful ever held. The Association's Contact Booth Program, with a total of 70 participating members, is scheduled for Wednesday and Thursday afternoons, May 18 and 19. This program has proved to be a popular attraction because it gives manufacturers, distributors and users of welding equipment and accessories a chance to talk over mutual problems.

Hear Various Speakers

At the opening Wednesday morning session James N. Alcock, Saginaw Welding Supply Co. and N.W.S.A. president, will present the annual address. He will be followed by Mr. Fernley. Members will then hear talks on sales, distribution and personnel problems by a trio of prominent speakers.

Report of the Manufacturers Relations Committee will be given by Chairman Glenn G. Garman of Purity Cylinder Gases, Inc.

Hold Panel Discussion

Thursday's activities will be highlighted by a panel discussion on "How to Increase Sales in a Buyers' Market." After hearing an address on creative salesmanship, delegates will receive the report of the Catalog Committee Chairman, William A. Rice of Virginia Welding Supply Co.

Election of officers for the 1955-

1956 year follows.

Thursday evening the Association's annual banquet and reception will be held. Principal speaker is John O. Christianson of General Motors Corp.

Finish Up on Friday

Three more prominent speakers will address N.W.S.A. members on Friday. They will cover use of psychology in selling, the role of the salesman's wife and why selling is interesting. Membership Committee Chairman Leslie P. Beaver, Beaver Welding Supply Co., will report to delegates.

National Welding Supply Association Celebrates 10th Anniversary This Month

A HISTORY OF THE N.W.S.A.

by **LEW GILBERT**
EXECUTIVE EDITOR

DURING the last decade the welding supply distributor has grown in stature, matured and become recognized as a primary factor in the remarkable growth of the welding industry.

How this was accomplished is an interesting story of the aggressiveness and determination of a small group of pioneers. The efforts of this group and the subsequent support of many other progressive welding distributors and alert and understanding manufacturers were entirely responsible for the success of the National Welding Supply Association.

Industry Reaches Cross Roads

Ten years ago the welding supply distributor was at the crossroads of a young, but promising, business career. On one hand were the problems of distrust, discord and unrest. On the other was the recognition that something must be done if the distributor was to remain an entity, an integral part of the fast growing welding industry.

Except for a single group of distributors, all handling the same line of nationally advertised electric welding products, there had been no real effort made to organize local suppliers. Yet, before this one group, because of inherent weakness, had begun to disintegrate, it became apparent that materially improved relations, between members and the manufacturer they represented, had been effected by that organization.

Although other distributors recognized the advantages of this "banding together", they were not permitted membership in that group because they represented other manufacturers.

Faced by direct selling competition from the very suppliers they represented, by woefully inadequate discounts—or "markups", by competition from chain stores, catalog houses, hardware, mill and automotive supply distributors—and without territory protection,

First president of the N.W.S.A., **L. O. Schneiderwind,** Omaha Welding Supply Co. (standing), and **George H. Ohmer,** first secretary-treasurer, are shown at one of the early Association meetings.

welding product distributors were in serious difficulties.

Relations between manufacturers and their dealers were, in many cases, based on the latter's bargaining power rather than on a fixed, equitable sales policy. More and more distributors began to realize that only in unity could they hope to protect themselves and their industry.

Weiler Takes the Initiative

In spite of discussions and attempts to get together in various parts of the country, nothing was accomplished until Herb Weiler, of Weiler Welding Co., Inc., Dayton, Ohio took the first steps toward forming a real distributor organization.

Disturbed by certain requirements of the company he represented, Herb Weiler decided to do something about it. He firmly believed that all distributors would be in a better position to deal intelligently with their suppliers if they could, as a group, exchange information and merchandising help.

"Pop" Rice Helps Out

One of the first people with whom Weiler discussed his theory was his good friend, V. S. Rice of Virginia Welding Supply Co., Charleston, W. Va., who was then visiting Dayton. Also one of the more progressive pioneers in the business, "Pop" Rice was a very responsive audience. From this "meeting-of-the-minds", in Herb Weiler's office in late Spring of 1945, developed the idea which started the National Welding Supply Association.

It remained for two other forward-looking people, Ed Caluwaert of O.K.I. Welding Supply Co., Cincinnati, Ohio and George H. Ohmer, a manufacturers representative with headquarters in Weiler's office, to help maintain the momentum. During the summer of 1945,

further discussions were held. Late that summer plans were completed and N.W.S.A. was on its way.

An original cash reserve of $100.00—put up equally by "Pop" Rice and "Tubby" Weiler—covered cost of organization stationery, preparation and printing of a constitution and the first general publicity. Organization headquarters were listed for the Weiler address and George H. Ohmer was appointed Secretary-Treasurer. A copy of the Constitution and By-Laws of N.W.S.A. was sent to all interested distributors. Official date of organization was September 17, 1945.

Prepare Market Studies

Starting immediately to build the group, George Ohmer prepared and distributed a series of interesting and valuable market studies. All of these described the serious problems facing welding distributors. Some of the data developed at that time is still interesting and instructive.

The first issue of SPATTER, circulated then, as it is now, "in the interest of the welding equipment and supply distributor", quoted the remarks of Irving B. Hexter, Publisher of INDUSTRY & WELDING, concerning the importance of a distributor organization and the value of good, honest relationships between distributors and manufacturers. Even at that time, Hexter's "One Publisher's Viewpoint" recognized the growing importance of good distribution in the growth of an industry.

It is interesting to note that an early issue of SPATTER which appeared in January, 1946, indicated a rosy future for welding. It announced that the value of welding equipment and supplies to be produced that year would represent a 40% increase over the best prewar year; that it would exceed the 220 million dollar mark. Ten years later, in 1955, the welding market is expected to approach the 700 million dollar mark.

The first general meeting of N.W.S.A., a Charter meeting, was held in Dayton, Ohio on November 13, 1945. Representatives of 12 dis-

THESE PIONEERS FOUNDED THE N.W.S.A.

V. S. RICE

HERB WEILER

ED CALUWAERT

tributors were present. These included five from Ohio, two each from Michigan, and West Virginia and one each from Illinois, Indiana, and Maine. In the meantime, on October 15th, it was announced that a manufacturer of oxy-acetylene equipment had become an associate member of the group.

Elect First President

At the next meeting of the Association, at the Van Cleve Hotel in Dayton, held on April 29th and 30th, 1946, Mr. L. O. Schneiderwind, of Omaha Welding Company, Omaha, Nebraska, was elected the first President.

On May 22, 1946 the National Welding Supply Association was incorporated as a non-profit organization, under Ohio laws, and a charter was issued. Members of the N.W.S.A. announced in the May 6th, 1946 issue of SPATTER included 27 of the most progressive distributors in the country. They represented that many different cities in over 20 states.

From that time, until the May, 1947, meeting in Philadelphia, George Ohmer served as Managing Director of the Association.

It is interesting to note that most of these distributors have prospered and are still active in the Association. James Alcock of Saginaw Welding Supply, one of the original members, is this year completing his term as President of N.W.S.A. Many of the others have been officers and directors of the group.

At the third regular meeting at Cedar Rapids, Iowa, November 8-9, 1946, it was decided that more experienced management was needed. After careful investigation the Fernley organization of Philadelphia was chosen to conduct further development and management of

William A. Rice, Virginia Welding Supply Co.; son of one of the Association's founders is shown (right) with **James N. Alcock,** Saginaw Welding Supply Co., and long active in N.W.S.A. affairs. Rice was Association president in 1953-54 and Alcock in 1954-55.

N.W.S.A. Effective with the meeting held in Philadelphia in May, 1947 the Fernley group took over, and the Association was given a Pennsylvania charter.

All during 1946 SPATTER continued to carry news of interest and value to welding supply distributors. All the welding magazines published photographs of the first officers of N.W.S.A. By November 18th, 22 additional distributors became interested and joined.

Threat to Existence

Just at this time the first real threat to existence of the National Welding Supply Association began to develop.

The independent organization of distributors, which had been formed in St. Louis, was beginning to fall apart. Some of the better known members of that group, and

some other influential people in the industry, were suggesting that a new association be formed — and that the new one absorb the young N.W.S.A.

For many obvious reasons, members of the National Welding Supply Association were not interested in the new idea. Most of them were quite bitter at the efforts of outsiders to undo all the good they had accomplished. A worthwhile, workable distributor organization had been perfected, and they intended to keep it that way. A committee was appointed to attend a meeting of the proposed new group to voice their objections. The meeting was held during the Metal Show, in Atlantic City, N.J. on November 20, 1946.

N.W.S.A. PRESIDENTS

1946-47—L. O. Schneiderwind, Omaha Welding Co.
1947-49—Ralph E. Chase, Chase Welding Supply Co., Inc.
1949-50—R. S. Mars, W. P. & R. S. Mars Company
1950-51—Glenn G. Garman, Purity Cylinder Gases, Inc.
1951-52—R. S. McCracken, Jr., R. S. McCracken & Sons, Inc.
1952-53—G. Milton Sims, Absco Welding Supplies
1953-54—William A. Rice, Virginia Welding Supply Co.
1954-55—James N. Alcock, Saginaw Welding Supply Co.

To combat propaganda handed out by those interested in formation of the new organization, Bob Mars of W. P. and R. S. Mars Co., Duluth, Minnesota, and Ed Caluwaert of O.K.I. Welding Supply Co., Cincinnati, addressed the joint meeting. Caluwaert described the efforts expended in behalf of N.W.S.A., its early history and its hopes and plans. Bob Mars discounted the need for a second, or new organization. He suggested that those present who were really interested in promoting the welfare of the welding industry could best do so by united effort. So well, and so sincerely, did these two men get their thoughts across, most of the dissenters eventually joined the N.W.S.A., and no further efforts were ever made to disturb continued expansion.

The first sectional, or zone meeting of the Association was held in Ohio early in 1947. This started a pattern which has been continued all over the country. Until May, 1949 at the Cincinnati convention, these were one day affairs. Since that time until the present, these meetings have grown in importance and attendance. They now last several days.

One-Man Crusade

During the winter of 1947-1948, Mr. V. S. Rice, still firmly interested in expanding the National Welding Supply Association, made a motor trip through the Southern states. Conducting a one-man, personal crusade, he visited every welding supply distributor he could reach. To all who would listen he extolled the virtues of membership in N.W.S.A. and preached the benefits of united action.

As a result of this basic ground

work, done by one of the original founders of the group, the area south of the Mason-Dixon line is one of the strongest membership spots in the Association.

An excellent foundation had been built by the early members, but the real growth of N.W.S.A. started at the Philadelphia meeting in 1947. By that time there were members in all sections of the country. The Association was rapidly being recognized by manufacturers as a stable, financially sound force for good in the industry. Early animosity and efforts to retard growth of the organization had disappeared. A united effort was being made by both manufacturers and distributors for the mutual benefit of all concerned—and the industry as a whole.

Cooperation and Confidence

It seems strange that there could have been a time when distributors and manufacturers each felt independent of the other. They now began to realize that cooperation and mutual confidence is necessary; that by working together they could better serve each other.

This change in the attitude of distributors toward their suppliers is indicated by a comparison of membership requirements at different stages in the development of N.W.S.A. In the original constitution, dated Sept. 15, 1945 manufacturers were admitted as associate members upon payment of $300 annual dues. At the same time distributor members were to pay only $50 to $100, depending upon their sales volume. An amendment at the Charter meeting in November, 1945 set dues for active members at $100.00 per year—but made no provision for manufacturing, or associate memberships.

Another amendment, at the April, 1946 meeting, was even more

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FOR ALL HEAT-DEPENDENT OPERATIONS

looks like a crayon... marks like a crayon... tells temperatures like a precision instrument!

Sixty-three different compositions enable you to determine and control working temperatures from 113° to 2000° F. TEMPILSTIK° marks on workpiece "say when" by melting at stated temperatures—plus or minus 1%.

ALSO AVAILABLE IN LIQUID AND PELLET FORM... WRITE **SALES DEPT.** FOR SAMPLE TEMPIL° PELLETS... STATE TEMPERATURES OF INTEREST—PLEASE!

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discriminatory. Dues for active members remained the same, but manufacturers were to be known as sustaining members, and were to pay a fee of $500 per year. Since the meeting in Philadelphia however, in May, 1947, manufacturing members of the Association are classified as Associate members, and pay the same $100 yearly dues as paid by active members.

A study made by the Association in February, 1946 indicated that 77% of the manufacturers were selling direct to consumers; only 23% through welding supply distributors. Now, with very few exceptions, all manufacturers sell through distributors.

Publish Directory in 1948

The first complete Directory of N.W.S.A. was published in 1948. Since then several have appeared. The last of these, distributed during the summer of 1954, included a complete listing of all members and the lines carried or manufactured by each. These directories are now considered extremely valuable merchandising and marketing data, by both the distributors and the manufacturers.

Practically every well known manufacturer of welding and cutting equipment, supplies and accessories is now a member of the National Welding Supply Association. Many of them take active parts in the meetings and affairs of the group. As Associate members, their activity is limited only insofar as holding office and voting are concerned.

As of this year, the National Welding Supply Association has a membership of over four hundred. It is now definitely recognized as a

If all the INDEPENDENT Acetylene CYLINDERS

we have built were filled at one time they would hold more than

60,000,000

cu. ft. of gas!

Furthermore, Independent Acetylene Cylinders hold from 5 to 10% more gas, and the uniformity of the monolithic filler insures even distribution of acetone. Oxygen storage cylinders available in 12 ft. & 20 ft. lengths; capacities 850 and 1500 cu. ft.

10 C.F. 40 C.F. 60 C.F. 100 C.F. 150 C.F. 250 C.F. 300 C.F. 340 C.F.

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Manufacturers of

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CYLINDERS AND GAS PRODUCING EQUIPMENT
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source of good in the industry. Its success is outstanding proof that reputable manufacturers and distributors can work together for individual profit and mutual well being.

Looking back and talking with other charter members of the Association, it is gratifying to realize that the group has passed the ten year mark. In a single decade it has accomplished a tremendous amount of good. It has been responsible, to a considerable extent, for the excellent relationships that now exist between distributors and their sources of supply. N.W.S.A. has made a major contribution toward the progress of the welding industry.

The N.W.S.A. has accomplished much for the welding industry. Not only has it worked to better conditions and relations between distributors and manufacturers, but by training and educating its distributor members and aiding in their growth has rendered a real service in methods of stocking and delivery and in general increasing efficiency of their operation.

Summary

The year 1954 has been an important one in the history of N.W.S.A.—as well as in the lives of individual members. Much has been accomplished by Jim Alcock

WELDING SUPPLY DISTRIBUTOR LOOKS INTO THE FUTURE

In our June issue, welding supply distributors look into their crystal balls and tell what changes will take place in the distribution of welding equipment and accessories in the next 10 years. They'll tell what effect these changes will have on distributors, manufacturers and users.

THE MOST ADVANCED AUTOMATIC FLUXING SYSTEM EVER OFFERED FOR BRAZING

EASY WAY TO LOW COST

• **All-State "Jet Flux" Auto-Dispenser No. 1 as you get it from the factory . . . is a pressure cylinder complete with automatic dispenser, controls, and hose with connections . . . ready to tie in, without special tools, to single or multiple brazing stations.**

• **Only one supply item—All-State "Jet Flux"—fluxes brazing work automatically through the fuel gas.**

See "Jet-Flux" demonstrated at the Welding Show

A-S DISTRIBUTORS EVERYWHERE

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ALL-STATE

WELDING ALLOYS CO., INC.
White Plains, N. Y.

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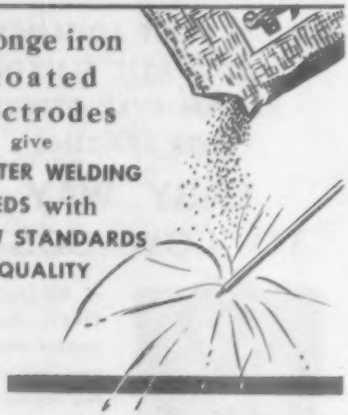
sponge iron coated electrodes give FASTER WELDING SPEEDS with NEW STANDARDS OF QUALITY



NOW . . . Hoeganaes Sponge Iron Powders have added new standards of performance to conventional electrodes. As an electrode coating, Hoeganaes Sponge Iron Powder is used by many leading manufacturers of welding electrodes to more efficiently use the heat of the arc. The result: faster speeds and new standards of quality.

Specification data available to Electrode manufacturers, write:

HOEGANAES SPONGE IRON CORP.

RIVERTON, NEW JERSEY

and his present officers. Much remains to be done.

Under the capable leadership of Ed Caluwaert, the Program Committee for the 1955 Convention at the Edgewater Beach Hotel in Chicago, has provided one of the most interesting and extensive programs ever presented. Members of the industry, from all sections of the United States, Canada, Hawaii, Mexico and some foreign countries are attending all sessions. "Contact Booth" participation on the part of manufacturer members is the largest in N.W.S.A. history. And, because of careful planning, more of the "fairer sex" have attended this annual meeting, enjoyed the program and facilities and generally "prettied up" the entire affair. This meeting is a fitting tribute to the imagination and perseverance of the early pioneers who started the drive which resulted in the National Welding Supply Association.

Looking back over the line-up of capable business men who devoted their time and energies to this organization, it is easy to see why it has come so far in ten years.

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Since the names of first officers, trustees and executive committee were published in the May 6, 1946 issue of SPATTER, the list of N.W.S.A. leaders has read like "Who's Who" in the welding industry. Each of the following men contributed ability, leadership and considerable business "Know-how" toward the success of N.W.S.A. Each deserves a vote of thanks for his part in the sound development and recognized importance of the organization.

These are the men who have given so much of themselves that all welding supply distributors may prosper;

Starting with Mr. Schneiderwind and his officers and executive group which included such men as Ralph Chase, V. S. Rice, Bill Boyd, W. J. Bentley, Herb Weiler, Glenn Garman, J. W. Albiston, W. C. Starcher, Ed Caluwaert, J. W. Richards, Jim Alcock, Ray Metzger, J. D. Hopper, F. B. Findley, V. B. Finch and Howard Proctor, a succession of important welding supply people guided the destinies of the Association.

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HARD-FACING ALLOYS

Easy to apply
by arc or torch. Flow on extra-readily in a uniform, slag-free layer.

Give Superior Resistance
to abrasion, corrosion, oxidation and impact—with high hardness—even at red heat.

Three Proven Grades
meet every requirement of production and maintenance, in every field.

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DISTRIBUTORS: We invite your inquiries.

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ANOTHER DE-STA-CO FIRST...
3 New Portable Clamps with
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MODEL 484

Instant easy action enables operator to clamp and release the tool with one hand... Clamping Pressures up to 1200 lbs.... Especially Rugged Construction for extremely long wear!

Two Other Models...

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MODEL 486

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DE-STA-CO DETROIT STAMPING COMPANY
World's FIRST Line of TOGGLE CLAMPS
324 Midland Ave. • Detroit 3, Michigan

X-RAY REQUIREMENT . . .

(Continued from Page 45)

sible. The tremendous saving in labor and time, lowered actual inspection cost to a point where it was below that of 250,000 volt units. The machine also provided much greater inspection capacity in number of articles to be inspected, thickness and density of materials, should the need have arisen.

What is Sensitivity?

One of the first questions the potential x-ray user asks is, "What sensitivity will this unit give me?" Sensitivity is usually expressed in percentages and therefore is at all times relative to thickness of the part being radiographed. In radiographic practice, sensitivity is a function of focal spot size, film characteristics, exposure distance and x-ray image contrast available.

The accepted standard of sensitivity is 2%. However, techniques, such as employing finer grain films, lead filters, lead masks, can all be used to increase sensitivity normally provided by any one particular x-ray unit. Even without special techniques, any good x-ray

Indexing Turntables, Positioners For Brazing And Welding

Spot Welding Tips Made To Your Specifications. All Types And Sizes

Spot Welders Press Foot Or Air Operated

Wire Butt Welders For Various Alloys And Saw Blade Welders

CHAS. EISLER, Jr., Pres.
EISLER ENGINEERING CO., INC.
735 So. 13th St.
Newark 3, N. J.

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unit should produce sensitivities of 2% or better.

As one can see from the foregoing, "You don't just buy an x-ray machine." All factors—sensitivity, rate of production, penetration needed, and latitude must be carefully evaluated to get a workable equation which can be translated into the x-ray unit best suited to your particular needs.

Two New Outlets Chosen by KG

KG Equipment Co., Inc., manufacturer of welding and cutting torches, regulators and related equipment has announced the addition of two distributorships. Welders Service and Sales Co. will cover the Cincinnati, Ohio area. Tennessee Welding Supply Co. will serve Knoxville, Tennessee.

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WRITE FOR CATALOG
Showing a Clamp for Every Purpose, openings from ¾" to 12' and depths from ½" to 16", also Chisels, Punches, Masonry Drills, Brace Wrenches, Washer Cutters, File Cleaners, etc.

THE CINCINNATI TOOL CO.
1985 Waverly Avenue • Cincinnati 12, Ohio

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TIMANG WELDING ROD and REPAIR SHAPES for welding MANGANESE STEEL

TIMANG welding rods assure economical, uniform welds. They equal the parent manganese steel in hardness, durability, strength, and work-hardening properties. Air-toughening, TIMANG needs no quenching.

Taylor-Wharton Manganese Steel Welding Repair Shapes, together with TIMANG welding rods, duplicate the wear-resistant qualities of the original material. They assure sound welds, with extreme economy and service life.

See your welding supplier.
Send for Bulletin No. 451.

TAYLOR-WHARTON IRON & STEEL CO.
(Div. of Harrisburg Steel Corporation)
HIGH BRIDGE 8, NEW JERSEY
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Bench-Type
Welding Positioner

• 100 LB. CAPACITY

Weight — 75 lbs. 12" x 11" x 9" high. Foot or hand control. Sturdy Construction. Table Rotation. Clock or anti-clock. 120v, 60 cycle single phase; ⅓ hp gear head motor. Speed 0 to 7 rpm. 90° Tilt.

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NEWS

From Page 21

Steel Founders Pick Willey

Robert A. Willey has joined the staff of the Steel Founders Society of America as Assistant Technical and Research Director. Mr. Willey comes to SFSA from Commercial Steel Casting Co., where he was Chief Metallurgist. He has authored several papers which have appeared in technical publications including *Industry and Welding.*

Chase Joints Torit

Frank R. Chase has been named Sales Manager for the industrial division of Torit Mfg. Co., William L. West, president, announced recently. Chase was sales promotion manager for Multi - Clean Products Co. of St. Paul for five years before joining Torit's staff. He will be in charge of sales and advertising for Torit dust collector products.

Tolliver Heads Tube Turns Sales

Jack D. Tolliver has been appointed manager of the recently established Sales Development Division of Tube Turns, pipe fitting and flange department of National Cylinder Gas Co. The announcement

was made by John G. Seiler, executive vice president and general manager of Tube Turns.

The Sales Development Division succeeds the company's Engineering Service Division and will be staffed with the same personnel.

Airco Researchers Take Prize

Dr. A. Muller and W. J. Greene of the Metallurgical Research Division, Air Reduction Co., have been awarded second prize in the Industrial Division of the American Institute of Electrical Engineering. Their paper, "Atomic Film Cathode in Inert Gas Shielded Metal Arcs," detailed developments with a new Airco electrode coating.

M & T Boosts Anderson

E. E. Anderson has been named Vice President of Metal & Thermit Corp., according to H. E. Martin, president of the company. Anderson has been with M&T for over forty years. Since 1940 he has headed the firm's West Coast operations.

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WELDER BRUSHES

for all types and makes of welding equipment

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from time lost due to "crawling" insulation on cables?
from lost hours reconnecting clamps that work loose?

SAVE YOUR MONEY . .
Try the H. J. Wagner Ground Clamp with the NEW connector that clamps around the cable, holding the insulation and absorbing the shocks.

WRITE FOR ILLUSTRATED LITERATURE

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Takes on P&H Welding Line

A new welding distributor in the Cleveland and Ashtabula, Ohio, areas has been appointed by Harnischfeger Corp., Milwaukee. New distributor is Welding and Cutting Supply Co., Cleveland, which also maintains a branch at Ashtabula under the name of Weld-Cut, Inc.

According to W. R. Stephens, sales manager of P&H Welding Division, the firm will handle the entire P&H line.

Burdett Names Jones

Wendell Jones has been named Plant Manager of the Burdett Oxygen Co.'s Youngstown, O., branch, according to William Loveman, president of the firm. Jones has been with Burdett for several years and is a member of AWS.

WHEN YOU WELD CAST IRON SELECT THE CORRECT

Fuse-Well

CAST IRON WELDING RODS OR ELECTRODES

FUSE-WELL NO. 11

FUSE-WELL No. 11, *Square*—Gray Cast Iron Welding Rod for Acetylene use in filling or building up new or worn castings producing machineable welds.

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FUSE-WELL No. 12, *Round*—Has the same uses and analytical ingredients as Fuse-Well No. 11.

FUSE-WELL NO. 14 MOLY

FUSE-WELL No. 14, *Moly*—An Iron Base Rod with alloys added for finer grain structure and greater strength.

FUSE-WELL NO. 22

FUSE-WELL No. 22, *Electrode* — Light coated Rod to be used for AC or DC welding in the fabricating and repairing of cast iron castings.

Sold through Leading Distributors

THE CHICAGO HARDWARE FOUNDRY CO.
Weld Rod Division
NORTH CHICAGO ILLINOIS

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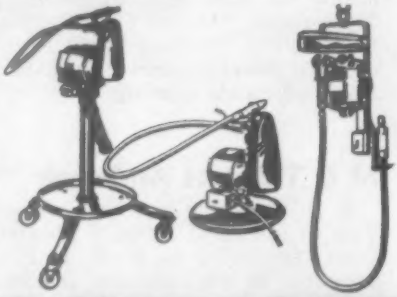

where there's a weld

HERE'S *the* WAY...

to smooth flawless seams and well-blended welds . . . and that's with Haskins Flexible Shaft Equipment. A light, high-speed handpiece, backed by controlled and sustained heavy duty power, makes smooth work of even the roughest weld quickly and inexpensively. That's why welders all over the nation rely on Haskins . . . manufacturers of flexible shaft equipment and attachments for every grinding, sanding, polishing and buffing need.

For additional information write:

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FLEXIBLE SHAFT EQUIPMENT
2653 W. Harrison St. • Chicago 12, Illinois

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Chicago Wheel Elevates Two

Chicago Wheel and Mfg. Co. has announced election of Arthur T. Dalton to the post of Vice President in charge of sales. Associated with the firm for 30 years, Dalton was

MANN

DALTON

formerly Secretary and Sales Manager. A past Director of the Grinding Wheel Institute, he has served in many advisory capacities since its inception.

At the same time, Henry M. Mann, formerly treasurer and chief of sales engineering was elected Secretary Treasurer.

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Choose Huntsman angle-shape for

- reduced glare from behind
- better top-of-head protection
- easy fit in your toolbox
- scientific upward ventilation
- longer helmet life

Specify the complete line of quality-built, guaranteed products

HUNTSMAN "face savers"

WELDING HELMETS, FACE SHIELDS & ACCESSORIES

Kodman Co., 233 So. 5th West, Salt Lake City 1, Utah

ANOTHER FIRST BY CARLSON!

A WELDER'S RULE with LENGTH TO SPARE!

CARLSON Super Chief 16 FEET LONG

⅝" WIDE WHITE BLADE

Here's a long, long, wide white blade in a compact pocket-size package, designed with the welder in mind. 6-feet longer than any rule now available, the Carlson Super Chief is extra long for extra convenience in one-man measuring. With the new, functional Super Chief, one-man measuring is easier, by far

It's a Welder's rule—with length to spare. Order yours from your hardware dealer or supplier.

Less Apt to Burn: Handy re-wind crank moves the 16-ft. blade smoothly in or out of case—without backlash—to protect blade from torches.
Quick Blade Change: Change to new blade in 10 seconds—without opening the case.
Easy-to-Read: Jet black numerals on new, wider snow-white blade won't surface crack or peel.
Converts Feet to Inches at a Glance: Double graduations show both feet and inches on full length of blade.
Patented Swing-Tip: For easier, quicker inside and butt-end measurements.

CARLSON & SULLIVAN, INC.
MONROVIA, CALIFORNIA

Produced under Patents 2089209, 2510939, 2629180 & Pat Pend.

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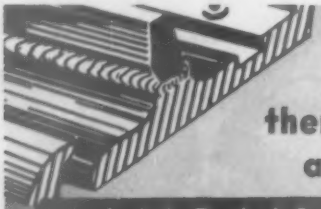

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11%-13½% Manganese-Nickel Steel

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TO FIT EVERY WORN TRACTOR GROUSER

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SOLE PRODUCERS
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Welding Researchers Have Work Cut Out For Them

More accurate scientific welding techniques can save industry millions of dollars, according to Welding Research Council Director William Spraragen. In addition to problems of technique, he listed four areas in which further research is urgently needed.

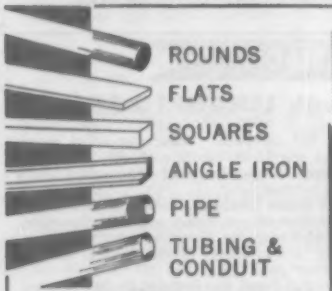
Brittle fractures, for example, still occur in welded or riveted ships, bridges, pressure vessels and storage tanks. Reasons for failure often are not fully understood.

Reinforced openings such as hatches on ships and storage tanks present difficulties not yet fully explored.

Code requirements specifying elongation values for high strength steels and non-ferrous materials are sometimes not realistic.

The fourth inadequately explored area lies in problems having to do with aircraft construction. Here are included such subjects as electrodes, multiple pass welding, evaluation of weldability of high strength aluminum alloys, non- destructive inspection of flashwelds.

The research council chief called



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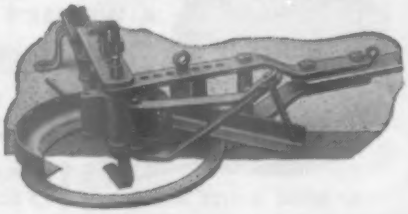
HOSSFELD MFG. CO.
436 W. 3rd Street • Winona, Minn.

ONE man bends all these on ONE machine . . .
the HOSSFELD UNIVERSAL® IRON BENDER



Wrenchless, the Hossfeld Bender is always ready for use. It's easily and quickly set up for the 101 different bends needed every day in maintenance and production work. Adaptable, it replaces special bending equipment. For those hard-to-pull bends on heavier material, a Hydraulic Attachment (optional) enables one man to do the job.

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for closer teamwork among scientific talent in educating engineers and writing codes. Such cooperation, he said, would reduce time lag between laboratory developments and field application of results.

Ductile Irons

Ductile irons are a family of cast metals. First produced commercially in 1949, they have established themselves as important engineering materials. These irons possess processing advantages of cast iron — good fluidity and castability, ready machinability and low melting point. At the same time they offer many of the engineering advantages of steel—strength, toughness, wear resistance and substantial ductility.

McKay Picks Canadian Outlet

Williams and Wilson, Ltd. has been designated by McKay Co. as its distributor for a complete line of welding electrodes in the provinces of Ontario and Quebec. The dealer maintains branches in Montreal, Windsor, Quebec and Toronto.

CONTOUR CUTTING

Doesn't have to be a hair pulling proposition!

Joe won the contract . . . but he lost money on the job. He should have used the H and M Shape-Cutter and Beveler. Joe didn't know it but the H and M could have saved **90% of his time** on those contour cutting problems. With the H and M Shape-Cutter all you do is attach the desired cutting pattern to the machine . . . slip the machine over the pipe and snap into place . . . light the torch . . . give the hand crank a few turns . . . and the job is done — the MAXIMUM SPEED WITH ACCURACY! Write today for the FREE folder, "MORE PROFIT DOLLARS . . ." to,

H&M PIPE BEVELING MACHINE CO.

311 E. 3rd St., Ph. 3-0241, TULSA, OKLA.

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MEETS EVERY STANDARD ACROSS THE WORLD!

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do you have a plant DERMATITIS PROBLEM?

If you have, you'll want a copy of this completely indexed, easy-to-use safety reference book. Second printing available for immediate shipment. Order your copy now. Price: $25.

- The Handbook gives immediate answers on what to do about hundreds of safety hazards. Whether you are a veteran or a beginner in safety work, this complete handbook, written in non-technical language, belongs on your shelf.

INDUSTRIAL BOOK CO.
1240 ONTARIO ST. • CLEVELAND 13, OHIO

OXY-ACETYLENE FLAME . . .

(Continued from Page 55)

in applications where extreme strength is required or where brazing does not lend itself to a particular operation. Mild steel rods in $\frac{1}{16}$ and $\frac{1}{8}$ inch diameter are used.

Remove Excess Flux

After components are brazed or welded, they are taken to an inspection table where joints are examined and surplus alloy is removed. After it has passed inspection, assembly is given phosphate treatment for about two minutes. This removes excess flux and etches metal for easy application of baking enamel.

When chairs call for a tapered rectangular type of leg, the part is fabricated from a piece of flat sheet steel which is formed to desired shape and joined by semi-automatic welding head driven along a rigid track by an electric motor. Accurate fixtures are used to make a perfect seam along the full length of the tapered tube.

To increase efficiency of the brazing and welding operations, acetylene and oxygen are piped to

ALJAY'S SAF-T WELDERS CLOTHING

Designed to give long-lasting protection.

Also
- Gloves
- Welding Curtains
- Soft and Pliable
- Full Cut
- Adjustable Snaps
- High Quality

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Write for descriptive literature and price information.
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1516 Callowhill St.
Philadelphia 30, Pa.

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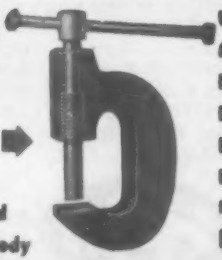
'Red Head'
WELDING CLAMPS

No Threads to Damage

DESIGNED for WELDING



- Threads never exposed
- Solid plate body

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various stations by a manifold system. This permits operators to better control gas pressures for the job on hand, gives more working room by eliminating storage of tanks at each station and minimizes any danger from explosions.

Free Clinics

Garden State Offers

A year long schedule of 29 free clinics covering everything from flame hardening to spot welding has been scheduled by Garden State Welding Supply Co., Jersey City, N. J. The clinics will feature live demonstrations and will be geared to actual problems of participating companies.

Dempsey Elevated

John B. Dempsey, Detroit branch manager, has been appointed Manager of Electric Tool Sales of Thor Power Tool Co., according to J. A. Hill, Thor vice president. Dempsey, who will make his headquarters in Aurora, Illinois, has been with Thor since 1938, starting as Philadelphia branch service engineer.

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***FERROMOLOSTIC!**

● **A special powdered iron coating* applied to nickel wire which produces sound, machineable welds in cast iron *easier, at lower cost!* Marquette's new No. 99 Nicol-Rod starts instantly, does not freeze to work when re-ignited, gives a soft, easy-to-handle, stable arc. The weld forms bond stronger than cast iron. Low expansion — contraction coefficient *ends cracking while cooling!*

See your Marquette distributor for a free demonstration.

When It Comes to Welding Come to

MARQUETTE

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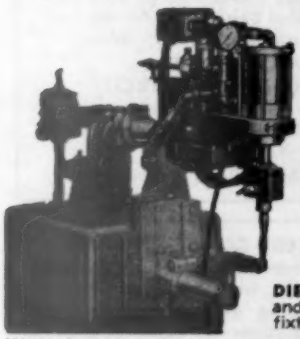

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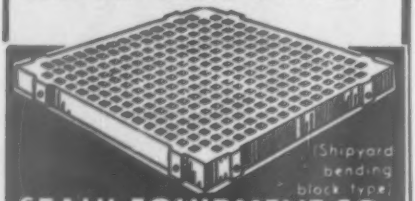

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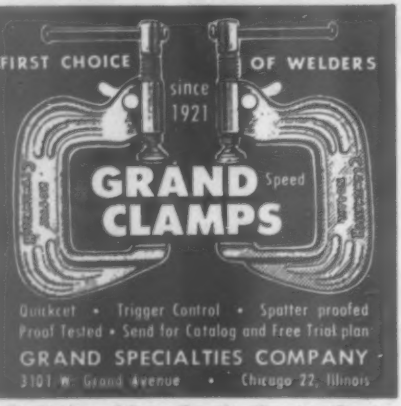

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Open Resistance Welding Research Center

A $750,000 technical research center to study resistance welding has just been completed in Los Angeles. Built under direction of Mario Sciaky, Sciaky Bros. Co., the center will not only develop practical data for specific problems, but will also carry out a long range program of basic resistance welding research. This will involve study of resistance welding and its behavior with various metals, variations imposed by ultrasonic and thermal conditions, low and high pressures, fatigue, tension and impact stresses.

Other phases of the program involve collection of data on joint resistance welding economies.

A specialized library for industry is being established, and facilities will be available for limited production and pilot runs, development of special tooling, electrodes and machines.

Equipment at the center known as the Sciaky Western Research Division, includes the world's largest three phase spot and seam welders, heavy duty flash butt and projection welding machines.

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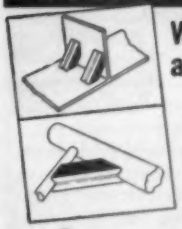

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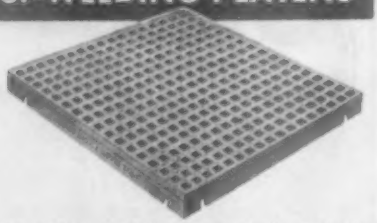

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WELDING TITANIUM . . .

(Continued from Page 69)

excellent quality of alloys that this note of caution may be of historical interest only when this article is published. The cause of the striations in the *beta* grains is unknown. This structure is typical of a brittle weld in the *alpha*+*beta* alloy and requires heat treatment to restore strength and improve ductility.

Structural transformations in these alloys are sluggish. At 1600° F for 15 minutes the precipitated *alpha* in the weld metal redissolves in the *beta*. Then the weldment is transferred to a 1335° F environment where isothermal transformation proceeds for 30 minutes. During this time cycle relatively coarse *alpha* is precipitated to form ductile weld metal. Table III compares the as welded and the postweld heat treated alloy. Tensile strength is better than the as received sheet. Although tensile elongation is improved fourfold, it remains at less than 25% of the unwelded titanium alloy value. Free bend ductility, however, is much improved by heat treatment and hardness is reduced although this heat treating procedure results in base metal and weld metal hardness greater than the as received, annealed sheet. Coarse, plate-like *alpha* uniformly distributed in *beta* is characteristic of ductile weld metal in *alpha* and *beta* titanium alloys.

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weld heat treatments. The *alpha+beta* alloys that can be welded require heat treating. Both inert-gas arc welding and resistance welding are acceptable processes.

Alloy Rods Promotes Hohman

George M. Hohman, formerly manager of Alloy Rods Co.'s Pacific Coast Division, has been named Vice President in charge of Production. This was announced by E. J. Brady, president of the York, Pennsylvania electrode firm.

In a previous edition, Industry and Welding mistakenly reported that Hohman would work from headquarters in New York. This should have read York, Pennsylvania, where the company maintains its main office.

Mathy Boosted at National

Appointment of Ernest L. Mathy to the posts of Vice President and General Manager of National Welding and Equipment Co. has been announced by Hugh F. Brown, company president. Choice of Mr. Mathy followed his election to the firm's Board of Directors. National is a leading manufacturer of oxy-acetylene welding and cutting equipment.

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